

HMT (INTERNATIONAL) LIMITED

A Govt. of India Undertaking

(OPEN TENDER)

BID DOCUMENTS

FOR SUPPLY, INSTALLATION & COMMISSIONING, TRIAL

for

Project: Setting Up of Indo-Belize Centre of Engineering, Belize

TENDER NO. 2 – Electrical Trainer Equipment	
Sl. #	ITEM
1	Electrical machine Trainer
2	3 Phase AC Integrated 300W motor
3	3 Phase Salient Pole Generator
4	Squirrel cage Induction Motor
5	1 Phase AC Integrated 300W motor
6	1 Phase AC Integrated Generator & Sync. 300W motor
7	DC Integrated machine
8	Oscilloscope
9	PLC Trainer Kit

TENDER NO: HMTI/PROJ/IBCE/S002/2018 Dated 11-05-2018

CLOSING ON: 04-06-2018, TIME 10.00 HRS

TECHNICAL BID OPENING ON: 04-06-2018, TIME 10.30 HRS

PLACE: HMT(I) Board Room, HMT Bhavan, No.59, Bellary Road, Bangalore.

The Tender document issued against payment of Rs 2,500.00 (Rupees Two Thousand Five Hundred only) in the form of a Demand Draft / Digital Transfer towards cost of tender document. The Bidder who choose to download tender document from website must submit the Demand Draft towards cost of the Tender documents along with Technical bids in Envelope-I.

ATTENTION

1. Only sealed Tenders shall be entertained. All joints of envelope should be sealed with wax with individual design stamped on it or with cello tape to ensure it is tamper proof.
2. Tenders not sealed shall be rejected straight away.
3. Do not use window envelope.
4. Lot-wise Technical Bid and Commercial Bid to be put in a separate cover super-scribing Tender Ref. No., Date, Submission date, Lot number and Bidder address on the top of envelope.
5. The Bidder may depute their authorized representative to witness the tender opening for both Technical and Commercial Bids.

HMT Bhavan, No.59, Bellary Road, Bangalore 560 032

Tel: 91- 80- 2333 9060, Fax: 91- 80- 2333 9048

Web Site: www.hmti.com, E-mail: projects@hmti.co.in

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SECTION I: INVITATION FOR BIDS (IFB)

HMT (International) Ltd, [HMT (I)] Bangalore invites sealed bids from eligible Indian bidders for supply, installation & commissioning, Trial of **“Electrical Trainer Equipment”** for the Project: Setting Up of Indo-Belize Centre of Engineering, Belize as per Schedule of Requirements / Scope of Supplies (SR) - (Section IV)

1. HMT(I) invites sealed bids from eligible bidders for the Supplies as above with details listed in Section IV.

Part bidding is not allowed

2. **Contact information**

The Joint General Manager, Projects
HMT (International) Limited,
59, Bellary Road, Bangalore-560032, INDIA
Tel No.: 080- 23339060
Fax No.: 080- 23339048
E-mail: projects@hmti.co.in / vaish@hmti.com

3. **Two bid System**

The two bid system will be followed. The bidder must submit his offer in two separate sealed envelopes as explained below:

Offer in the prescribed forms Section – V, Annexure 1 to 8 should be submitted in the following manner.

Envelope I: “Technical bid”: The sealed envelope shall contain all the copies of technical bids Lot-wise separately together with Commercial Bids without indicating the prices. This envelope shall be clearly marked **“Part I - Technical bid”**, indicating Tender No., Closing Date & Time, and bidder address duly filled.

The envelope-I should be duly sealed on all joints with wax with an individual design stamped in it or tamperproof sealing using cello tape.

This part shall include / indicate the following:

1. The Bidder shall provide requisite documentary evidence for pre-qualification criteria as stated below, **failing which, the Bids may result in rejection:**
 - The Bidder’s annual turnover (average) for 3 years shall be atleast Rs. **1,00,00,000/- (Rupees One crore only)** in the last three financial years.
 - The Bidder shall quote for all mentioned under Scope of Supply. Part bidding is not allowed.
 - The Bidder must have minimum 3 years continuous experience in manufacturing / supply of items specified in the Scope of Supply. **Attach at least one Purchase Order copy of each year separately for three years.**
 - Bidder should submit satisfactory certificate from at least 2 reputed clients to whom similar nature of supplies has been rendered.
2. **The Bidder shall submit Earnest Money Deposit of Rs. 75,000/- (Rupees Seventy Five thousand only) in the form of Demand Draft / Digital Transfer drawn in favour of HMT (International) Limited payable at Bangalore in separate envelopes for each lot in the Technical Bid. .**

The bidders registered with NSIC will be exempted from payment of EMD on submission of Valid Registration Certificate.

- The Bidder shall quote for all the items mentioned under Scope of Supply. However, part bidding is not allowed.

3. The bidder must be a manufacturer or an authorized dealer/HMTI vendor.
4. Technical bids without prescribed cost toward tender cost & EMD in the form of Demand Draft/ Purchase receipt will be rejected summarily.
5. Bid documents Purchase Receipt / DD / Digital Transfer in favour of HMT(I), **Bangalore for Rs.2,500/- if tender documents** are downloaded from website.

6. Duly filled Technical bid for each Lot separately with proper seal and signature of the authorized person on each page of the bid submitted.
7. Complete Scope of Supplies with all necessary details and acceptance of commercial terms and conditions as provided under Section IV & V Lot-wise separately.
8. Make / Model for each of the item to be specified in the Quotation and the Catalogues to be enclosed with the technical bid.
9. Bids shall be valid for a minimum period of 90 (ninety) days from the last date of submission.
10. Furnish acceptance for providing Performance Bank Guarantee for 10% of the contract value in the event of tender being awarded.
11. Point-wise details for the services/requirements/details required in the bid documents shall be furnished. If there are any deviations, the same should be clearly specified in Annexure-2 of Section-V.
12. Self attested copy of GST registration certificate as applicable.
13. List of customers both domestic & overseas to whom similar supplies have been provided in the past 3 years in the prescribed format Section-V, Annexure-3.
14. Satisfactory certificate from at least 2 reputed clients to whom similar nature of supplies has been rendered.
15. Vendor Registration form – Section – V, Annexure – 6 duly filled {Only for New Vendors of HMT(I)}.
16. Copy of ISO-9000 Certificate, if applicable.
17. Payment Terms. As per clause 13 in Section-III. Specify deviations if any.
18. A copy of “Un-Priced Section – V, Annexure–1” i.e., a copy of the Price Schedule without the price details.

In case of vendors opting for Digital transfer of EMD & Tender document fees, A/c details of HMT(International) Ltd is as detailed below:

Name:	HMT(International) Limited
Bank:	Bank of Maharashtra City Market Branch Bangalore-560 002 - Branch Code: 304
MICR No:	560014002
Account Type:	Current Account
Account No.	20061601773
IFSC Code:	MAHB0000304
Swift Code:	MAHBINBBGL

Envelope II: “COMMERCIAL BID”: This sealed envelope shall contain price details. This envelope shall be clearly marked “Part II - Commercial Bid”, indicating Tender No., Closing Date & Time and bidder address duly filled (separately for each Lot).

The Envelope – II should be duly sealed on all joints with wax with an individual design stamped on it or tamperproof sealing using cello tape.

- Prices should be offered in **Indian Rupees only**. Should furnish break up of price as required in Section V; Annexure – I. The prices quoted shall be for **F.O.R Nhava Sheva Port** and considered firm and not subject to any change.
- The supplies shall be guaranteed against defects of material and workmanship for a period of 12 months from the date of commissioning. The supplier will arrange for free supply and replace/repair at his cost at site any part that may be found defective and necessitates replacement due to design, manufacture and material defect during warranty period. HMT(I) shall provide airfare, local hospitality to experts deputed during the warranty period as per the mutually agreed terms.
- All prices & other information like discount etc., having a bearing on the prices shall be written both in figures & words in the prescribed offer form. In the event of difference, the price in words shall be valid and binding. **If any GST is applicable, the same should be indicated separately.**
- The terms of payment for supplies will be as indicated under clause 13 in Section-III – Terms and conditions of the Contract. The bidder has to accept the payment terms. Any deviation in the payment terms offered shall be considered and suitable Bank interest of 18% per annum will be loaded for comparison purposes only. However acceptance of the payment terms indicated by the bidder is subject to approval of Purchase Committee.
- **The bidder should quote their lowest possible price.**

- HMT(I) shall award the contract to the eligible bidder whose technical bid has been accepted and determined as the lowest evaluated Commercial Bid (L1) on lot wise. L1 shall be decided on Lot price basis.

4. Date of submission of bids and opening of the Technical bid:

Both the envelopes (Part I & II) Lot-wise shall be put in one cover, duly sealed on all joints with wax with an individual design stamped on it, or put cello tape to ensure it is tamper proof and super scribing Tender No., closing date & time, opening date & time, Lot number and Bidder address.

The envelopes which are not sealed will be rejected straightaway/summarily.

The sealed bids should be dropped in the tender box provided in the HMT(I) office and ensure delivery **on or before 1330 hrs (IST) on the closing date**. Late offers will not be considered.

Last date for submission of bids: 4th June, 2018 up to 1000 hrs. Technical bids will be opened on 4th June, 2018 at 10.30 hrs in the Board room of HMT(I) office, Bangalore.

END OF SECTION I

SECTION II- INSTRUCTIONS TO BIDDERS (ITB)

1	<p>Definitions and Interpretation</p> <p>The “HMT(I)” / “BUYER” means: HMT(International) Limited, No.59, Bellary Road, Bangalore-560 032.</p> <p>The “Supplier” means any firm/institute/company to whom the contract is awarded.</p> <p>“SITE” means IBCE, University of Belize, Belize, where the supplies are required to be supplied.</p> <p>“PROJECT” means “Setting Up of Indo-Belize Centre of Engineering at University of Belize, Belize city, Belize”</p>
2	<p>Compliance of Requirements</p> <p>2.1 The supplies offered should be in accordance with the stipulated requirements in the “Scope of Supply”. The bidder shall indicate his compliance or non-compliance against each of the requirements.</p>
3	<p>Place of Delivery of supplies: All supplies are to be delivered to HMT(I)’s shipping agent at Nhava Sheva Port as per the instructions given by HMT(I) at the time of dispatch.</p>
4	<p>Criteria for pre qualification of Bidder</p> <p><u>The Bidder shall satisfy the following prequalification criteria:</u></p> <p>The Bidder shall provide satisfactory documentary evidence acceptable to HMT(I) to show that:</p>
4.1	<p>The Bidder’s annual turnover (average) is at least Rs. 1,00,00,000/- (Rs. One crore only) in the last three financial years. The Bidders should furnish audited accounts for previous 3 years.</p>
4.2	<p>The Bidder must have minimum 3 years continuous experience in manufacturing / supply of items specified in the Scope of Supply. Attach at least one Purchase Order copy of each year separately for three years.</p>
4.3	<p>Bidder should submit satisfactory certificate from at least 2 reputed clients to whom similar nature of supplies has been rendered.</p>
	<p>Bidder who does not submit the above required information along with documentary evidence at the time of bidding; their bid may be rejected.</p>
5	<p>Cost of bid documents</p>
5.1	<ul style="list-style-type: none"> o The cost of bid document is Rs 2,500.00 (Rupees Two Thousand Five hundred only). o The cost shall be payable in the form of a crossed Bank draft / Digital Transfer in favour of HMT (International) Ltd, Payable at Bangalore and kept along with the Technical bid documents in Envelope –I, if the bid documents are down loaded from website. o If the documents are purchased from HMT (International) Limited, copy of the receipt for payment of cost of bid documents shall be kept along with the Technical bid documents in Envelope –I. o In case, the Bidder quotes for more than one lot, the copy of the receipt for payment of cost of bid documents shall be kept along with the Technical bid documents in Envelope –I for each lots separately. o If the cost of bid document is not paid before opening of the Technical bid, the bids will be rejected straightaway/ summarily.
6	<p>Earnest Money Deposit</p>
6.1	<p>Earnest Money Deposit for amount of Rs. 75,000/- (Rs Seventy Five thousand only) shall accompany Technical bid documents of tender.</p> <p>The Earnest Money Deposit shall be in a crossed Bank Draft/Digital Transfer in favour of HMT (International) Ltd, Payable at Bangalore. <u>However, the bidders registered with NSIC will be exempted from payment of EMD on submission of Valid Registration Certificate.</u></p>
6.2	<p>The Earnest Money Deposit shall remain deposited with the HMT(I) for the period of 90 (ninety) days from the date of opening of tenders. If the validity of the offer is extended, the EMD shall remain with HMT(I).</p>
6.3	<p>No interest will be payable by the HMT(I) on the Earnest Money Deposit.</p>
6.4	<p>The Earnest Money deposited is liable to be forfeited if the bidder withdraw or amends, impairs or derogates from the tender in any respect within the validity of his offer.</p>
6.5	<p>The Earnest Money Deposit of the successful bidder will be returned after the P.O. is released on successful Bidder and duly accepted and submission of Performance Guarantee.</p>
6.6	<p>If the successful Bidder fails to furnish a contract performance guarantee, then the earnest money shall be liable to be forfeited.</p>
6.7	<p>The Earnest Money Deposit of all unsuccessful Bidders will be returned to the bidder by HMT(I) after finalization of contract with the successful bidder.</p>
6.8	<p>If Earnest Money for amount as stipulated in clause 6.1 is not enclosed in the Technical documents in Envelope –I, the bid</p>

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	will be rejected straight away / summarily.
7	Period of validity of bids
7.1	Bids shall be valid for a minimum period of 90 days from the last date of submission.
7.2	HMT(I) may ask for the bidder's consent to extend the period of validity. Such request and the response shall be made in writing only. A bidder agreeing to the request for extension will not be permitted to modify his bid. The technical clarifications, if any, shall be furnished by Bidder within one week's time.
8	Deadlines for submission of bids
	Bids must be received by HMT(I) before the due date and time at the address specified in the tender document. In the event of the specified date for the submission of bids being declared as a holiday for HMT(I), the bid-closing deadline will stand extended to the next working day up to the same time.
8.1	HMT(I) may extend this deadline for submission of bids by amending the bid documents and same shall be suitably notified in HMT(I) website: www.hmti.com
8.2	Any bid received by HMT(I) after the deadline for submission of bids, will not be accepted and returned unopened to the bidder.
9	Opening of Commercial bids by HMT(I)
9.1	The Technical Bids will be evaluated to shortlist the eligible bidders.
9.2	Bidder whose Technical Bid is found to be acceptable and meeting the eligibility requirements as specified in "Clause 4" will be informed about the date and time of the opening of the Commercial Bid.
9.3	HMT(I) will open Commercial Bids of only the technically accepted and short listed bids, in the presence of the bidder or their authorized representative who choose to attend the bid opening, at the time and date to be informed later.
9.4	The bidder's authorized representative may attend the bid opening shall sign an attendance register as a proof of having attended the bid opening.
9.5	The bidder's name, bid prices, discounts and such other details considered as appropriate by HMT(I), will be announced at the time of opening of the Commercial Bids.
10	Comparison of Bids
	Bids received against the tender will be evaluated by the Technical Evaluation Committee (TEC) for technical suitability and will be shortlisted.
10.1	Short listed Technical bids shall be considered for commercial evaluation and Commercial Bid opening.
11	Award Criteria
11.1	HMT(I) shall award the contract to the eligible bidder whose technical bid has been accepted and determined as the lowest evaluated Commercial Bid on lot wise.
11.2	Should the amount put in words differs from the amount put in figures, or if there is an arithmetical error, the lesser amount shall be taken unless the difference is attributable to an obvious error, whereupon the correct amount shall be taken.
11.3	If more than one bidders quotes same lowest price, HMT(I) reserves the right to award the contract at its own discretion.
11.4	HMT(I) reserves the right to increase or decrease the quantum of supplies offered by the successful bidder at the rates & other terms and conditions offered by them. The Bidder is bound to accept the increase or decrease in the quantum of supplies during awarding the contract.
12	HMT(I)'s Right to amend Scope of Supplies
12.1	HMT(I) reserves the right to accept or reject any or all bids without assigning any reason whatsoever.
12.2	HMT(I) reserves the right to increase or decrease the scope of supplies indicated in the bid documents after the award of the tender and payment shall be made on pro-rata basis.
12.3	HMT(I) reserves the right to cancel/short close/extend the order at any given point of time due to Force Majeure or directions from the Governments of India or Belize.
12.4	HMT(I) reserves the right to cancel / short close the order due to non-satisfactory performance by any of the service / supply offered. Cost / damages arising out of such cancellation / short closure shall have to be borne by the bidder
12.5	Buyer shall recall any of the experts deputed to the project site on non-compliance to the rule of the land or guidelines laid down by Govt. of India / Govt. of Belize / HMT(I) or any act that does not correspond to ethical behavior. Cost / damages arising in such an event shall be borne by the bidder and shall forthwith send suitable replacement.
13	Corrupt or Fraudulent Practices.
13.1	HMT(I) requires that the bidders who wish to bid for this project have highest standards of ethics.
13.2	HMT(I) will reject a bid if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices while competing for this contract;
13.3	HMT(I) may declare a vendor ineligible, either indefinitely or for a short period, if HMT(I) is aware that the vendor has

SECTION II- INSTRUCTIONS TO BIDDERS (ITB)

	engaged in corrupt and fraudulent practice during the execution of the contract.
14	Interpretation of the clauses in the Tender Document / Contract Document In case of any ambiguity/ dispute in the interpretation of any of the clauses in this Tender Document, HMT(I)'s interpretation of the clauses shall be final and binding on all parties.
15	General
15.1	All offers shall be either Computer prints or hand written neatly in indelible ink. Tenders shall be free from CORRECTION AND ERASURES, and Corrections if any, must be attested. Each page of the offer must be numbered consecutively, should bear the tender number and should be signed by the Bidder at the bottom. A reference to the total number of pages comprising offer must be made at the top right hand corner of the first page.
15.2	The Bidders must ensure that the conditions laid down for submission of offers detailed in the preceding paras, are completely and correctly fulfilled.
15.3	The submission of any offer connected with these supplies and documents shall constitute an agreement that the Bidder shall have no cause of action or claim, against HMT(I) for rejecting the offer. HMT(I) shall always be at liberty to reject or accept any offer or offers at its sole discretion
15.4	Offers shall be deemed to be under consideration immediately after they are opened and until such time the official intimation of award of contract is made by HMT(I) to the Bidder. While the offers are under consideration, Bidders and or their representatives or other interested parties are advised to refrain from contacting HMT(I) by any means. If necessary, HMT(I) will obtain clarifications on the offers by requesting for such information from any or all the Bidders, only in writing. Bidders will not be permitted to change the contents of their offers after the offers have been opened.
15.5	Any individual(s) signing the tender and related documents should be a competent authorised person or original copy of power of authorization issued by the competent authority should accompany the tender.
15.6	Offers shall be as per the Instructions to Bidders and Terms & Conditions of contract given in bid documents. However the Bidder shall indicate his acceptance or otherwise against each of clause and sub clauses of the Instruction to Bidders and Terms & Condition of contract. For this purpose, the Bidder shall enclose a separate statement as per format Section-V(2) indicating only the deviations from any clause or sub clause of the Instructions to Bidders and Terms & Conditions of contract which Bidder proposes with justification for each deviation. The HMT(I), however reserves the right to accept or reject these deviations and decision there on shall be final and binding.
15.7	Bids shall be complete in all respects accompanied by detailed literature, brochures with all necessary details in ENGLISH or otherwise, the bids will not be considered.
	End of SECTION-II

SECTION III: SPECIAL CONDITIONS OF CONTRACT (SCC)	
1	<u>Execution:</u> Metric System
2	<u>Colour :</u> As specified in the Technical Specifications.
3	<u>Electricals:</u> Main supply: 220 V, 3 Ph, 60Hz AC / 110 V, 1 Ph, 60Hz AC Supply
4	<u>Delivery period for supplies:</u> F.O.R Nhava Sheva Port within 8 weeks from the date of purchase order. Delivery is the essence of the Contract. If there is delay penalty as per clause 14 is applicable.
5	<p><u>Inspection, Re inspection and Acceptance:</u> The items shall be manufactured as per International Standards. The standards followed should be accepted by HMT(I). For this purpose, the supplier shall furnish HMT(I) the standards being followed immediately for acceptance. The supplies will be inspected by HMT(I) as decided by HMT(I). If any of the item is found defective, HMT(I) reserves right to procure the substitute for the defective items from elsewhere at the risk and cost of the supplier and recover from the supplier the extra expenditure, if any incurred by HMT(I). Consignment shall be dispatched only after getting acceptance letter from HMT(I).</p> <p>At least 2 weeks prior intimation regarding readiness of supplies, in all respects must be furnished to HMT(I) for inspection by HMT(I) Quality Assurance Department or by its authorized representative. All equipment including packing cases must be offered for inspection. HMT(I) reserves right to inspect the items by HMT(I) and customer representative at supplier's works.</p> <p>The supplies will be inspected by HMTI by deputing HMTI's quality assurance personnel to the vendor's worksite. Inspection and other deputation charges for the deputation of HMTI personnel shall have to be borne by the vendor.</p> <p>Vendor has to indicate the number of days of inspection required for each of the equipment quoted by them separately. The inspection charges to be paid to HMT(I) before starting of inspection.</p> <p>Incase inspection days are extended due to non-readiness of equipment,</p>
6	<p><u>Re-Inspection:</u> HMT(I) reserves the right to re-inspect the supplies, only in cases where the HMT(I) Inspection Engineers recommend for such cases after completion of modifications suggested during the inspection. All costs towards re-inspection will have to be borne by the vendor.</p>
7	<p><u>Packing:</u> All Supplies shall be packed in seaworthy wooden cases (as per international standard) suitable for shipment by 20ft / 40 ft containers of size (LXBXH): 5900mmx2300mmx2300mm / 12000mmx2300x2300mm respectively. Packing cases must have case-wise detailed packing list to be put inside the cases. Also, 3 copies of casewise packing list to be sent to HMT(I) immediately after packing. All loose items to be tagged with Sl. As per PO. Packing to be made in the presence of HMT(I) inspection engineers.</p>
8	<u>Port of Shipment and Discharge:</u> Nhava Sheva Port and Port Belize, Belize.
9	<p><u>Freight & Insurance:</u> Supplier to dispatch the goods on Freight Prepaid –Door Delivery basis to HMT(I) shipping agent at Nhava Sheva Port of shipment. Transit insurance to be arranged by supplier. Supplier to inform HMT(I), despatch details like Lorry receipt No., No. of Packing cases, Gross Weight, Net Weight etc., immediately after dispatch from works.</p>
10	<u>Consignee:</u> Consignee will be intimated later
11	<u>Invoice to :</u> HMT (International) Limited, 59, Bellary Road, Bangalore – 560 032, India TIN NO. 29760097661/GST No. 29AAACH8197C1ZD. A/c. IBCE, University of Belize, Belize City, Belize.
12	<u>Price:</u> The price shall be F.O.R Nhava Sheva Port and considered firm and no escalation will be permitted.
13.1	<p><u>Payment Terms for supplies:</u> 100% payment for supplies will be payable on 60th day from the date of delivery to our shipping agent at Nhava Sheva. If the Payment terms are not acceptable, the vendor can quote their own payment terms. 18% per annum interest will be loaded to the quoted price for arriving at the total price for price evaluation only as per tender terms. However, the acceptance of the payment terms indicated is at the sole discretion of the Management. All bank charges such as L/c opening charges, negotiation charges, etc., are to the account of supplier, if supplier requires payment by inland L/C.</p>
13.2	<u>Payment for services portion:</u> The payment will be made after getting certificate confirming successful Installation and customer Training at site in IBCE, University of Belize, Belize city, Belize.
14	<p><u>Penalty for delayed Supply and Services:</u> HMT(I) reserves the right to levy penalty @ 1.0 percent of order value per week of delay beyond the scheduled deliveries /</p>

	execution of the contract successfully, subject to maximum of 10% of the contract value. HMT(I) reserves the right to cancel the contract in case the delay is more than 10 weeks. The penalties, if any shall be recovered by invoking the Performance Bank Guarantee or withholding the amount out of the payments due.
15	<p><u>Clearance for Despatch:</u> Equipment shall be dispatched only after getting acceptance letter from HMT(I). Such clearance shall be furnished only after receipt of a certificate from Supplier stating that the snags, if any, pointed out by HMT(I) Engineer/Customer's representative have been duly attended to. HMT(I) shall have the right to hold up the dispatch for want of any clearance from the customer. The consignment shall be shipped through a reputed Transporters in a direct truck to reach HMT(I)'s shipping agent with out any transshipment.</p>
16	<u>Name & Address of the Shipping Agent</u> : Will be informed at the time of dispatch clearance by HMT(I).
17	<p><u>Technical Documents:</u> Supplier to forward the detailed drawings of the all machines / equipment in 3 sets, indicating details about civil work required, Electrical, Pneumatic, Water connection points etc., immediately on receipt of Purchase Order. Instruction / Operating Systems / Spare Parts Manual and other relevant documents pertaining to the Equipment must be in English and should be supplied in (3) three sets as follows :</p> <ul style="list-style-type: none"> o 2 Sets of Manuals along with the machine / equipment o 1 set Manual to HMT(I), Bangalore o Two copies of Electrical wiring drawings (along with the machine / equipment) o Instructions for commissioning (One copy along with the machine / equipment) and one copy to HMT(I) o Final Test & Inspection Report (along with the machine / equipment)
18	<p><u>Bought Outs:</u> All the bought-out items such as bearings, belts, electricals, motors, contactors, switches etc., shall correspond to ISI / International Specifications and shall be of reputed make like, SKF, FENNER, SIEMENS & TELEMCHANIC etc.,</p>
19	<p><u>Rejection & Risk:</u> If, HMT(I) finds that the materials supplied are not of correct quality or not according to the specifications as indicated in the bid offer, then HMT(I) will be entitled to reject the machine/equipment without any cost obligation on HMT(I).</p>
20	<p><u>Performance Bank Guarantee (PBG):</u> The successful bidder will be required to furnish Performance Bank Guarantee for 10% amount of the FOR price for the supplies value, as per the format attached to this document (Refer Section – V; Annexure – 4). This bank guarantee shall remain valid until the expiry of warranty period or for the period of 12 months beyond the completion of Erection & Commissioning. If the Bidder is not acceptable to furnish Performance Guarantee 10% of the FOR price for the supplies value will be retained as “retention money” till expiry of warranty period or for the period of 12 months beyond the completion of Erection & Commissioning. Performance Bank Guarantee for 10% of the FOR price for the supplies value is required for the Lots mentioned.</p>
21	<p><u>International Warranty:</u> The supplies shall be guaranteed against defects of material and workmanship for a period of 12 months from the date of trails and commissioning or 15 months from the date of shipment, whichever is earlier. Until the expiry of the warranty period, the supplier is obliged to do repairs, modifications, setting right and adjustments considered necessary to guarantee the rated output and to replace any part of the machine / equipment found defective and necessitate replacement due to design, manufacture, and material defect during the warranty period at vendors cost at project site in Belize.</p> <p>HMT(I) has to provide total warranty for the complete project for 1 year from the date of handing over to the concerned authorities. Since the vendors are providing only 12 months warranty from the date of trails and commissioning the items at site or 15 months from date of shipment, to cover up the liability and commitment till completion of warranty of 12 months from the date of handing over, 20% + applicable GST of the quoted FOR cost indicated will be charged towards trails and extended warranty period to cover up spares costs, travelling expenses and service charge for the deputation of HMTI / vendor experts to site for carrying out servicing/maintenance/ repair at site. This amount is to be paid to HMT(I) before despach of machine from vendor works.</p> <p>The supplier will arrange for free supply and replace/repair at his cost at site any part that may be found defective and necessitates replacement due to design, manufacture and material defect during the extended warranty period. HMT(I) shall provide airfare, local hospitality to experts deputed during the warranty period as per the mutually agreed terms.</p>
22	<p><u>Installation</u></p> <ul style="list-style-type: none"> o The supplier shall depute, the required technical personnel for carrying out installation and providing training to the customer's personnel in operation & maintenance of items at project site in Belize. o HMT(I) shall arrange to provide, free furnished bachelor's accommodation, local transport and necessary assistance in

	<p>getting VISA for the Technical Personnel deputed to site in Belize. To&fro Airfare, Boarding expenses, Travel Insurance and incidental expenses to be borne by the supplier.</p> <ul style="list-style-type: none"> o The supplier shall depute their personnel within 15 days from the date of intimation of readiness at project site in Belize. o All necessary tooling, instruments etc., which are required for installation will be carried by the supplier o Necessary tools, fixtures, instruments, trail materials, consumables etc., for installation to be sent along with the items. o In case the technical personnel extended their period of stay beyond the stipulated/required/agreed time, the additional cost for their extended stay has to be borne by the supplier.
23	<p>Arbitration: All disputes of any kind arising out of supply, acceptance, warranty maintenance etc., shall be referred after issuance of 30 days notice in writing clearly mentioning the nature of dispute to a single arbitrator to be appointed by HMT(I). The venue for arbitration shall be Bangalore.</p>
24	<p>Jurisdiction: The disputes, legal matters, court matters, if any shall be subject to Bangalore jurisdiction only.</p>
25	<p>Force Majeure: HMT(I) may consider relaxing the penalty and delivery requirements, as specified in this document, if and to the extent that, the delay in performance or other failure to perform its obligations under the Contract is the result of a Force Majeure. Force Majeure is defined as an event of effect that cannot reasonably be anticipated such as acts of God (like earthquakes, floods, storms etc.), acts of states, the direct and indirect consequences of wars (declared or undeclared), hostilities, national emergencies, civil commotion and strikes at successful Bidder's premises. Either party shall be excused from performance of their obligation during or to the extent that performance is prevented by the occurrence of unforeseen causes beyond the control of and without the negligence of the party claiming excuse. Such causes shall include, without limitation, strike, go slow , other concerted acts of workmen, lockout, Act of God, war, fire, explosion, action of elements, flood, epidemic, riot, sabotage, embargo, blockade, civil disturbance and Governmental restrictions or limitations etc. The party claiming excuse shall give immediate written notice thereof to the other, in any case not later than 15 (fifteen) days, following the occurrence of such event. If performance is held for a continuous period of more than 3 (three) months from the date of first notice, then the parties shall review the situation and agree upon any course of action so as to protect the interest of both.</p>
	End of Section III

SECTION – IV: SCHEDULE OF REQUIREMENTS / SCOPE OF SUPPLIES (SR)

Schedule of Requirements / Scope of Supplies is as detailed below

Electrical Trainer equipment

Project: Setting up of Indo-Belize Centre of Engineering, University of Belize, Belize City, Belize				
Sl. #	Annex. Ref.	Description	Brief Specification	Qty
1	Sl. No 28 of Encl 1 of DPR Annex 2	Electrical machine Trainer		1
2	Sl. No 28 of Encl 1 of DPR Annex 2	3 Phase AC Integrated 300W motor		1
3	Sl. No 28 of Encl 1 of DPR Annex 2	3 Phase Salient Pole Generator		1
4	Sl. No 28 of Encl 1 of DPR Annex 2	Squirrel cage Induction Motor		1
5	Sl. No 28 of Encl 1 of DPR Annex 2	1 Phase AC Integrated 300W motor		1
6	Sl. No 28 of Encl 1 of DPR Annex 2	1 Phase AC Integrated Generator & Sync. 300W motor		1
7	Sl. No 28 of Encl 1 of DPR Annex 2	DC Integrated machine		1
8	Sl. No 28 of Encl 1 of DPR Annex 2	Oscilloscope		1
9	Sl. No 28 of Encl 1 of DPR Annex 2	PLC Trainer Kit		1
FOR DETAILS REFER ENCLOSURE - 1				

End of Section IV

SECTION V– COMMERCIAL

Annexure – 1

PRICE SCHEDULE

Electrical Trainer equipment

Project: Setting up of Indo-Belize Centre of Engineering, University of Belize, Belize City, Belize						
Sl. No	Annex Ref.	ITEM	Brief Specification	Qty	Unit F.O.R. Nhava Sheva Port Price in Ind. Rs	Total F.O.R. Nhava Sheva Port Price in Ind. Rs.
1	Sl. No 28 of Encl 1 of DPR Annex 2	Electrical machine Trainer		1		
2	Sl. No 28 of Encl 1 of DPR Annex 2	3 Phase AC Integrated 300W motor		1		
3	Sl. No 28 of Encl 1 of DPR Annex 2	3 Phase Salient Pole Generator		1		
4	Sl. No 28 of Encl 1 of DPR Annex 2	Squirrel cage Induction Motor		1		
5	Sl. No 28 of Encl 1 of DPR Annex 2	1 Phase AC Integrated 300W motor		1		
6	Sl. No 28 of Encl 1 of DPR Annex 2	1 Phase AC Integrated Generator & Sync. 300W motor		1		
7	Sl. No 28 of Encl 1 of DPR Annex 2	DC Integrated machine		1		
8	Sl. No 28 of Encl 1 of DPR Annex 2	Oscilloscope		1		
9	Sl. No 28 of Encl 1 of DPR Annex 2	PLC Trainer Kit		1		
Total F.O.R Nhava Sheva Port Price in Indian Rupees with seaworthy packing						
Cost of trails, extended International Warranty @ 20% + applicable GST of FOR Price						
Total F.O.R Nhava Sheva Port Price in Indian Rupees						
Cost towards Installation, commissioning and training the customer's personnel in operation and maintenance for above equipment at project site in Belize.						
*Total cost of equipment including I & C in Indian Rupees (in words):						

***Total should include the cost towards the following:**

- Deputation of technical personnel for carrying out installation, commissioning, trials, training the customer's personnel in operation and maintenance of above equipment at project site in Belize.
- Necessary tools, fixtures, instruments, trial materials, consumables, etc, for Installation and training have to be sent along with the supplies.

Please indicate the man day rates considered for deputation on the format given below

Sl No.	No. of Persons required for Installation of equipment	No. of Man days required	Cost per man day (In Rs.)

It is hereby certified that we have understood the instruction to Bidders and also the Terms & Conditions of Contract attached to the tender and have thoroughly examined and are aware of the nature of supplies/services required and our offer is to render supplies/services strictly in accordance with the requirements and according to the terms of the tender. We agree to abide solely by the terms & conditions of contract and other conditions of the tender in accordance with the tender documents if the contract is awarded to us.

We hereby offer to render supplies/ services as detailed above or such portion thereof as you may specify in the acceptance of tender at the price quoted and agree to hold this offer open for acceptance for a period of 90 days from the date of opening of tender. We shall be bound by the communication of acceptance dispatched within the prescribed time.

We possess the necessary License from the Government of India/State Government for rendering the supplies / services.

Dated:.....

Signature and seal of Authorized Signatory

NOTE

1. The offer must be submitted as per above proforma. The Bidder may use his letterhead to submit his offer.
2. No erasures or alternations in the text of the offer are permitted.
3. Any correction made in offer shall be initialed by the Bidder.
4. VALUES should be both in figures and Words.
5. **The prices quoted should be most competitive**

End of Section V

PROFORMA FOR COMMERCIAL DETAILS & PREVIOUS EXPERIENCE

- (i) Is the firm registered with Govt. Authority/ Agency or MNC? If so, a copy of the registration certificate should be enclosed.
- (ii) Name and address of the Banker

Details of major orders for the quoted supplies/services executed during the past three years should be furnished in the following format.

Sl. #	Full Address of Customer	Order No. and Date	Description of Supplies / Services	Qty.	Contract Value in Rs.	Remarks
1	2	3	4	5	6	7

Signature:.....
Name:.....
Designation:.....

NOTE: A certificate from the customer should preferably be enclosed to indicate that the contract was satisfactorily performed.
To be enclosed for each lot separately.

PROFORMA FOR PERFORMANCE BANK GUARANTEE

THE JOINT GENERAL MANAGER, PROJECTS
HMT (INTERNATIONAL) LTD.
HMT BHAVAN
59 BELLARY ROAD
BANGALORE – 560 032

DEAR SIR,

THIS DEED OF GUARANTEE EXECUTED BY BANK, (NAME AND ADDRESS OF THE BANK) (HEREINAFTER REFERRED TO AS BANK) IN FAVOUR OF HMT (INTERNATIONAL) LTD. (HEREINAFTER REFERRED TO BENEFICIARY) NOT EXCEEDING RS..... (RUPEES ONLY) AT THE REQUEST OF M/S. (HEREINAFTER REFERRED TO AS SUPPLIER).

WHEREAS THE SUPPLIER HAS APPROACHED BANK TO ISSUE BANK GUARANTEE IN YOUR FAVOUR FOR A SUM OF RS. (RUPEES ONLY). WHEREAS THE SUPPLIER HAS RECEIVED PURCHASE ORDER NO. DATED FOR RS FOR PROVIDING SERVICES AS STATED IN THE PURCHASE ORDER. WHEREAS THE SUPPLIER HAS TO SUBMIT PERFORMANCE GUARANTEE FOR TEN PERCENT OF THE VALUE OF SUPPLIES PORTION OF RS.....AS STATED IN THE SAID PURCHASE ORDER.

WE HEREBY CONFIRM AND STATE THAT WE AS GUARANTORS SHALL BE RESPONSIBLE TO YOU ON BEHALF OF THE “SUPPLIER” FOR A TOTAL SUM OF RS..... (RUPEES ONLY) IN CASE OF VIOLATION OF ANY OF THE TERMS/CONDITIONS OF THE SAID PURCHASE ORDER.

WE UNDERTAKE TO PAY YOU UPON FIRST WRITTEN DEMAND DECLARING THE “SUPPLIER” TO BE IN VIOLATION/BREACH OR CONTRAVENTION OF ANY OF THE TERMS AND CONDITIONS, WITHOUT DEMUR OR ARGUMENT OR COURT ORDER OR RESOLUTION WITHIN THE VALIDITY OF THIS GUARANTEE, A SUM OF RS..... (RUPEES ONLY) AS AFOREMENTIONED WITHOUT YOUR HAVING TO PROVE TO US OR TO SHOW GROUNDS OR REASONS FOR YOUR DEMAND FOR THE SUM SPECIFIED HEREIN.

THE GUARANTEE CONTAINED HEREIN SHALL NOT BE AFFECTED BY ANY CHANGES IN THE CONSTITUTION OF THE BANK OR IN THE CONSTITUTION OF THE BENEFICIARY VIZ. YOURSELF AND SHALL BE VALID TILL (DATE) FROM THE DATE OF ISSUE PROVIDED HOWEVER THAT IN CASE DEMAND IS NOT MADE BY YOU UNDER THIS GUARANTEE ON OR BEFORE (DATE) , BANK SHALL BE FULLY ABSOLVED FROM ANY LIABILITY UNDER THIS GUARANTEE DEED.

WE HEREBY DECLARE AND STATE THAT THIS GUARANTEE UNLESS INVOKED BY YOU AS AFORESAID SHALL BE VALID TILL (DATE) FROM THE DATE OF ISSUE AND SHALL BE NULL AND VOID THEREAFTER WHETHER THE ORIGINAL GUARANTEE IS RETURNED OR NOT

PROFORMA FOR VENDOR APPRAISAL

General Information

Vendor Code

1. Company

M/s. _____ _____ _____ _____ City: _____ PIN: _____	Phone: _____ _____ Fax: _____ E-Mail: _____ _____ Web Site: _____ _____
--	---

2. Contact Person

Name: _____	Designation: _____
E-Mail: _____	Phone: _____

3. Number of Years in Business :	_____
4. Number of Units :	_____
5. Total Number of Employees :	_____

6. Major Customers

1) _____	4) _____
2) _____	5) _____
3) _____	6) _____

<input type="checkbox"/>	<input type="checkbox"/>
Y	N

7. Sales Office/Authorized Distributor

If yes Indicate details below

A M/s. _____ _____ _____ _____ _____ PIN _____ Phone: _____ Fax: _____ E-Mail _____	M/s. _____ _____ _____ _____ _____ PIN _____ Phone: _____ Fax: _____ E-Mail _____
---	---

<p>C M/s. _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p style="text-align: center;">PIN _____</p> <p>Phone: _____</p> <p>Fax : _____</p> <p>E.Mail _____</p>	<p>M/s. _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p style="text-align: center;">PIN _____</p> <p>Phone : _____</p> <p>Fax : _____</p> <p>E.Mail _____</p>
--	---

Production & Service Capabilities
1 Product Range

<p>a _____</p> <p>b _____</p> <p>c _____</p> <p>d _____</p> <p>e _____</p>	<p>f _____</p> <p>g _____</p> <p>h _____</p> <p>i _____</p> <p>j _____</p>
--	--

2 Processes Existing in the Plant

Processes	Availability	Details
1 Conventional Machining	<input type="checkbox"/> Y <input type="checkbox"/> N	<div style="border: 1px solid black; padding: 5px; display: inline-block;">N.A</div>
2 CNC Machining	<input type="checkbox"/> Y <input type="checkbox"/> N	
3 Forging	<input type="checkbox"/> Y <input type="checkbox"/> N	
4 Casting	<input type="checkbox"/> Y <input type="checkbox"/> N	
5 Plating	<input type="checkbox"/> Y <input type="checkbox"/> N	
6 Fabrication	<input type="checkbox"/> Y <input type="checkbox"/> N	
7 Tool Making	<input type="checkbox"/> Y <input type="checkbox"/> N	
8 Welding	<input type="checkbox"/> Y <input type="checkbox"/> N	
9 Gear Manufacturing	<input type="checkbox"/> Y <input type="checkbox"/> N	
10 Designing	<input type="checkbox"/> Y <input type="checkbox"/> N	

Quality Information
1 Control adopted

	Availability	Details
a In-Process Inspection	<input type="checkbox"/> Y <input type="checkbox"/> N	<p>_____</p> <p>_____</p> <p>_____</p>
b Stage Inspection	<input type="checkbox"/> Y <input type="checkbox"/> N	
c Testing	<input type="checkbox"/> Y <input type="checkbox"/> N	

d SQC/SPC Y N

2 Inspection & Testing Facility Available

Details

a Material Testing Y N

b Precision Measurement Y N

c Furnace Testing Y N

d Non-Destructive Testing Y N

e Calibration Y N

3 Quality System Implemented-ISO 9000/QS 9000 Y N

Enclose Certificate

4 Capability to supply products with CE Marking Y N

5 Quality Level of Existing Products

1 2 3 4 5
 Poor Fair Good Very Good Excellent



Commercial & Financial Information

	2014-15	2015-16	2016-17
1 Annual Turnover for last 3 Years in Rs.Lakhs			
Net Profit for the last 3 years Rs. Lakhs			

2 Exports Y N

If Yes, Turnover for last 3 Years in Rs.Lakhs

	2014-15	2015-16	2016-17

3 Specify Countries to which Exports are made

USA	<input type="checkbox"/>
UK	<input type="checkbox"/>
Europe	<input type="checkbox"/>
Middle East	<input type="checkbox"/>
CIS Countries	<input type="checkbox"/>
Others	<input type="checkbox"/>

4 Any Collaboration Y N

If Yes, Indicate Details

5	Any investment Envisaged for Expansion	<input type="checkbox"/> Y	<input type="checkbox"/> N	
6	Is company following Direct Procurement Principle	<input type="checkbox"/> Y	<input type="checkbox"/> N	
7	KST / CST Registration No.			
8	Central Excise	No		
		Range		
9	SSI Registration No.			
10	Do you have Company Brochure	<input type="checkbox"/> Y	<input type="checkbox"/> N	
11	Experience in handling Government of India's projects	<input type="checkbox"/> Y	<input type="checkbox"/> N	
	If yes, value of projects executed so far Rs. Lakhs			
12	Is the company registered with MEA ?	<input type="checkbox"/> Y	<input type="checkbox"/> N	
	If Yes, Value of Supply done to MEA Projects	Rs. Lakhs	Direct supply	Thru Agency
13	Supplies done to HMT(I)	<input type="checkbox"/> Y	<input type="checkbox"/> N	
	If Yes, Value of Supplies done Rs. Lakhs			

Details of supplies to HMT(I):

Compiled by:

Signature: _____

Name: _____

Date: _____

Note:

- 1 Put V in appropriate check box.
- 2 If space provided is not sufficient to provide details, please attach extra sheet.
- 3 Please attach catalogue/Brochure if available.

		Annexure - 6
PROFORMA FOR VENDOR REGISTRATION		
S.N.	Description	Details
	(a) Name and address of the vendor	
	(b) Please specify whether you are : Manufacturing Unit / Distributor / Agent etc.,	
1	(c) Telephone No.	
	(d) Fax No.	
	(e) Email ID	
	(f) Company Profile (Please enclose)	
	(g) Turnover of the Company for the past three years	
	(h) Bankers Details	
2	Quality system implemented - ISO 9000 / QS 2000 etc.	
3	Name, address & Telephone No. of the owner / proprietor/partners	
4	Sales Tax Registration No. - Central & State	
6	Registration No.	
7	Details of Products Manufactured / Distributed / offered. Please enclose brochure.	
8	Details of Manufacturing Units / Workshops etc., available	
9	Details of Machines, equipment, computers available	
10	Manpower / Organization structure	
11	List of Major Products / Services	
12	Details of your major customers	
13	Are you exporting Products / services? If so, please furnish details of exports for past 3 years.	
14	Are you providing training to overseas students/trainers and if so, give details of the training courses conducted for last 3 years	
15	Do you have branches or institutes under your group, If yes, give details with address.	
16	Whether you are affiliated / accredited to any Govt. Agency / Reputed organization	
Declaration: I / We declare that the details given above are true and correct.		
Place :		
		Signature of Authorized person
Date :		With Company Seal

(Note: Please attach detailed information in a separate sheet wherever required)

PROFORMA FOR BANK GUARANTEE FOR BID GUARANTTEE

To,

The Joint General Manager (Projects)
HMT (International) Limited
HMT Bhavan, No.59, Bellary Road
BANGALORE – 560 032

Dear Sir,

In accordance with your invitation to tender No.....M/s. hereinafter called the bidder with the following Directors on their Board of Directors/Partners of the firm:

- 1.
- 2.
- 3.
- 4.
- 5.

wish to participate in the said tender for supplying Machine / equipment required for the project at IBCE, University of Belize, Belize City, Belize being implemented by HMT (International) Limited, Bangalore.

As a Bank Guarantee against Bid Guarantee for a sum of Rs.....(in words & figures) valid for 90 days from the date of opening of the Tender No..... is required to be submitted by the bidder as a condition for the participation, this bank hereby guarantees and undertakes during the above said period of 90 (Ninety) days to immediately pay, on demand by HMT (International) Limited, Bangalore in writing the amount of Rs..... (words & figures) to HMT (International) Limited, Bangalore without any reservation and recourse, if:

- 1) The bidder after submitting his tender, modifies the rates or any of the terms and conditions thereof, except with the previous written consent of the purchaser or
- 2) The bidder withdraws the said bid within 90 days after opening of bid or
- 3) The bidder having not withdrawn the bid, fails to furnish the contract of Performance Guarantee within the period provided in the terms and conditions of the contract.

This guarantee shall be irrevocable and shall remain valid up to 4.00 p.m. on.....if further extension to this guarantee is required, the same shall be extended to such required periods on receiving instructions from M/s.....on whose behalf this guarantee is issued.

Date.....

Signature.....

Place.....

Printed Name.....

Witness

1.....
.....
(Designation)

2..... (Bank's Common Seal)

(Note : This should be on bidders letter head)

QUALITY AND PACKING DETAILS

1. MACHINE / EQUIPMENT:

- 1.1 Machine / Equipment shall be manufactured and delivered in accordance with the specifications as given in this Tender and quality shall be as per Indian / International Standards.
- 1.2 Goods supplied shall be new, genuine, unused and shall be of current models and of current productions.
- 1.3 Any alteration to the specifications, Design, Patterns etc. of the offered goods shall only be made upon the Buyer's consent in writing.
- 1.4 The Tenderer warrants that the materials, metals, chemicals, paints, packing pieces etc. used in the manufacture of goods and all its packing and packaging are fully trivalized and stable under tropical conditions. Any damages arising from the inadequate trivalization, shall be deemed an inherent defects of manufacture.
- 1.5 **BOUGHT-OUTS:**
All the bought-out items such as bearings, belts, electricals, motors, contactors, switches, MCBs, fuses, transformers, rubber gaskets, O-rings, conduit pipes, coolant and hydraulic hoses etc. **shall correspond to ISI / International specifications, should preferably have CE mark** and shall be of reputed make like SKF, FENNER, BHARAT, BIJILEE, CUTTLER HAMMER, CROMPTON GREAVES, SIEMENS and TELEMECHNIC.
- 1.6 Bought-out accessories like Furnace Lamps, pumps, Panel Air conditioners, Oil Coolers, Panel Boards, Stabilizers, Transformers etc. should be from reputed original equipment manufacturers.
- 1.7 Machine / Equipment aesthetics especially sheet metals, guards, doors, covering plates, castings are to be made to international standards. Painting and finish of Furnaces are the most important aspects of aesthetics.

2. INSTRUCTION & SPARE PARTS MANUALS:

- 2.1 Neatly printed manuals should be sent with the Machine / Equipment. Instruction Manuals should be of updated version containing complete details of offered Machine / Equipment including customer name, Machine / Equipment number, Machine / Equipment model, year of manufacture etc..
- 2.2 Drawings should be clear and legible. Xerox copies are not acceptable. Details of bought-out items used in the Machine/Equipment should be included in the manual. Good quality paper should be used for printing of manuals.
- 2.3 All foundation drawings showing electrical, air, water and other service connections of Machine / equipment, with floor plans to be provided in two sets, in English.

3. SAFETY DEVICES:

Each Machines/equipment should be provided with adequate and all necessary safety devices for the protection of the operator/s, factory personnel and the environment.

4. OTHER CONDITIONS:

Since Machine / Equipment are being exported, Machine / Equipment including all accessories have to be built to ensure high quality performance, aesthetic appearance in respect of general finish, painting, sheet metal fabrication and international safety regulations.

5. PACKING INSTRUCTIONS:

- 5.1 Export worthy wooden / plywood packing as per Indian / International standards suitable for sea freight.
- 5.2 Equipment, accessories and spares are to be covered by thick silpaulin sheet or 1 mm thick polythene sheets and all openings are to be sealed .
- 5.3 All external bright / machined surfaces should be protected with coating of OKS-CORTEC VCI 369 N Rust preventive. OKS rust preventive to be used.
- 5.4 Rust preventives to be used whose shelf life is not less than one year.
- 5.5 Packing list with respect to each case to be prepared and given to HMT(I) along with other documents.
- 5.6 Machine / Equipment should be firmly fixed to be base of packing case to prevent jerking or local movement.
- 5.7 Delivery Voucher should clearly indicate packing case dimension with net and Gross weight and case number if there are more than one case.
- 5.8 Photographs before and after packing to be taken and sent to HMT(I).
- 5.9 Handling marks of the packing cases to be shown on packing cases.

Electrical Trainer Equipment – Electrical Machine Trainer

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.	
Ref. No. Sl. No. 28 of Enclosure 1 (DPR Annexure-2)	
Item : Electrical Machine Trainer	Qty : 1 No.
Sl. No.	Description
1.	Electrical Machine Trainer – (Table mounted with castor wheels) with standard and required accessories suitable for Electricals 220V, 3Phase, 60 Hz AC supply / 110V, 1 phase, 60Hz AC.
1.1	Technical Specifications :
1.1.1	<p>Features :</p> <ul style="list-style-type: none"> • Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. • All machines should be mounted on finely painted sturdy base frame with easy machine inter-changeability. • Should be able to draw all graphs • Machines should operate up to 300W power levels and up to 1800 RPM. • Must use Trunnion mounted DC machine as Dynamometer for loading other machines with facility to measure shaft power using electronic torque / speed measurement • One Dynamometer type DC m/c per aluminum Rack with multiple panels <p>A) Technical Specifications of interfacing panel rack - 2 Nos. Powder coated Sturdy aluminums Flat panel system made up off Alluminium extruded profiles carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Should be able to hold following control panels with colorful overlay.</p> <p>B) Each control panel rack consists of :-</p> <p>Input 3 phase DOL Starter panel [10 Shrouded Banana] 2 Nos</p> <ul style="list-style-type: none"> • 4 pole MCB of 220 V/1A . • DOL 9A Contactor with 110V / 60 Hz / 11VA COIL . • Bimetallic thermal O/L relay with range 1.4A - 2.3A . <p>Multifunction 3 Phase Meter 4 Nos.</p> <ul style="list-style-type: none"> • Connection : 3Phase 3/4 wire • Volts Input : 220V/110V AC • Aux Supply : 110V AC, 45-65Hz,5W • Display : LCD Display • CT Input : 5A, 0.1 VA/Ph. • Measurement: V, I, Hz, Pf, KVA, KW, KWh • Computer Input : Modbus RTU RS 485 • Termination : SBSS Terminal <p>FWD/REV ,Star-Delta starter panel [12 Shrouded Banana] 2 Nos</p> <ul style="list-style-type: none"> • FWD/REV, 3 pole 3 way switch with centre OFF,6A/220V. • Star/Delta switch 3 pole ,3 way with centre OFF,6A/220V. <p>3 Phase wound Rotor & Sync. Motor panel [8 Shrouded Banana] 2 Nos</p> <ul style="list-style-type: none"> • Rotor resistors of 30E/5A with 3 taps of 0E, 15E, 21E, 30E <ul style="list-style-type: none"> • Rotor resistor selector switch ,3 pole.6 Way .6A/220 V. • DC Rotor excitation over current relay (3Amp)

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. Sl. No. 28 of Enclosure 1 (DPR Annexure-2)

Item : Electrical Machine Trainer

Qty : 1 No.

Sl. No.	Description
	<p>1 Phase Motor, Alternator & Sync. Motor Panel [14 Shrouded Banana] - 2 Nos.</p> <ul style="list-style-type: none"> • 1ϕ MCBs of 4A/1.6A – 2nos. • 2no 2P2W selector switches to run as 1ϕ alternator then as synchronous motor. • 8A pushbutton switch to simulate as centrifugal switch. <p>DC voltmeter and DC ammeter panel [14 Shrouded Banana] 2 Nos</p> <p>a) DC voltmeter(0-150V) b) DC Ammeter (0-5A) with polarity protection diode c) Field failure relay to control Armature supply. Both 6A/6B needed simultaneously.</p> <p>SCR Actuator (variable DC) cum sensor signal conditioning panel [4 Shrouded Banana]-6 Nos.</p> <ul style="list-style-type: none"> • Half bridge SCR based 0V-120V / 5 Amp cosine firing with linear characteristics. • Supports signal conditioning circuit for speed, torque in kg wt to output 0-2.5Vdc (FS). • 3 Nos. of these supplies required for DC Armature, DC motor field and AC generator field. <p>Instrumentation Power supply cum Multichannel DPM panel [10 Shrouded Banana] 2 Nos</p> <p>(a) +/-12 V ,500 mA (b) +5V ,300mA (c) Unregulated 17V dc/750 mA (d) line synchronizing signal. (e) 13V / 3 Amp. (f) Multi channel DPM for digital display of torque, speed etc</p> <p>Resistor Load Panel 2 Nos</p> <p>Should have off position to run on no load. (1)AC Resistors = 10K/200WX3 phases/ 6 steps (2) DC Resistors = 750E/400W / 6 steps</p> <p>LC Load panel 2 Nos</p> <p>(A) Inductive load = 0.15H/0.3H/0.45H/0.6H/0.75H/1.5H/3H/400mAX3Nos. (B) Capacitive load =1.25μ/2.5μ/5μ/415VX 3Nos.</p> <p>Computer Interface panel connects to pc usb port using usb IO module through 25 pin D (M) connector on CIP & Type A to mini B cable consisting of 4 ADC channels i/p: 0 to 2.5V with 1 no. AI input simulation pot, 1 DAC channel O/P 2.5 V, V to I function block I/P 0 to 2.5V & O/P 0-20 or 4-20 mA (100E load) switch settable, I to V function block: I/P 4 to 20 mA & O/P 0-2.5V, DC V/I measurement panel using MIT12 panel. facility of modbus to communicate AC multi parameter measurement meter (MMM)/Power Network analyzer. supplied in electrical machine trianer quoted above. Software on CD: Virtual Workbench package is a USB / serial modbus based software working on windows dot Net platform coupled with USB IO module useful as general purpose utility which supports different control strategies like Single or multi loop PID controllers, Fuzzy controller etc, Graph plotting in XY, XT and polar mode etc, Modbus interface, Data logging, Event trigger, inbuilt Function generator etc 2 Nos</p> <p>C) Machine set should consists of following machines:</p> <p>a. DC INTEGRATED M/C 2 Nos</p> <p>Voltage : $V_{arm} = 120V$, $V_{field} = 120V$ Capacity/RP M/Terminals : 300W / 2 Pole m/c / 1800RPM 6 terminals Rotor Construction : Should be Standard commutator / brush arrangement with laminated stack, brought out on 2 terminals Stator Construction : separately excited field winding with laminated pole solid yoke and series winding brought out on 4 terminals Chassis mounted, 19mm dia, trunion mounted Machine for use as Dynamometer with torque & speed sensors. Must be able to work as shunt/series/compound motor as well as generator.</p>

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. Sl. No. 28 of Enclosure 1 (DPR Annexure-2)

Item : Electrical Machine Trainer

Qty : 1 No.

Sl. No.	Description
	<p>b. 3 Phase AC Integrated m/c - 1 No. Voltage : 220VAC, 60Hz Capacity/RP M/Terminals : 300W / 4 Pole m/c / 1800RPM 10 terminals Rotor Construction : must be Star connected, four terminals including star point brought out on 4 slip rings mounted on shaft. Stator Construction: Six terminals to be brought out to start the machine using STAR - DELTA Starter. Chassis mounted, 19mm dia, Application: Must work as slip ring wound rotor I.M, synchronous motor, and synchronous generator.</p> <p>c. 1 Phase AC Integrated m/c - 1 No. Voltage : 110VAC, 60Hz Capacity/RP M/Terminals : 300W / 4 Pole m/c/ 1800RPM 10 terminals Rotor Construction : Diecast Rotor Stator Construction : Must have Two windings brought out on 4 terminals for main and auxiliary to configure different motors Split phase , CSCR, CSIR. Chasis mounted with 19mm dia.</p> <p>d. 1 Phase Synchronous m/c - 1 No.. Voltage : 110VAC, 60Hz Capacity/RP M/Terminals : 300W / 4 pole m/c / 1800RPM 4 terminals Rotor Construction : should have Single phase wound rotor with terminals brought out on two slip rings mounted on shaft. Stator Construction: One winding will be used to configure synchronous motor and Alternator output when used as single phase generator. Chasis mounted with 19mm dia.</p> <p>e. Universal Motor - 1 No. Voltage : 110VAC, 60Hz / 150Vdc Capacity/RP M/Terminals : 300W / 4 Pole m/c / 1800RPM 4 terminal. Rotor Construction : Standard commutator . brush arrangement brought out on 2 terminals Stator Construction : Stator brought out on 2 terminals to facilitate AC/ DC operation & direction change. Built in compensating winding to minimize AR & sparking. Chasis mounted with 19mm dia.</p> <p>f. 3 phase squirrel cage motor -1 No. Voltage: 220VAC, 60Hz. Capacity/RP M/Terminals : 300W / 4 Pole m/c / 1800RPM 12 terminals Rotor Construction: Diacast rotor. Stator Construction: 6X2 terminals brought out to run machine at two speeds using pole changing method, Chasis mounted with 19mm dia. Applications: Motor should work as Induction generator, Torque speed curve in both motor as well as generator mode.</p> <p>g. Repulsion Motor -1 No. Voltage : 110VAC, 60Hz Capacity : 300W / 4 Pole m/c/1800 rpm 2 terminals Rotor Construction : Standard commulotor brush but short circuited Stator construction : Standard brought out on 2 terminals. Settable handle to rotate brush position w.r.t. Neutral axis.</p>

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. Sl. No. 28 of Enclosure 1 (DPR Annexure-2)

Item : Electrical Machine Trainer

Qty : 1 No.

Sl. No.	Description	
	<p>Chasis mounted with 19mm dia.</p> <p>h. 3 Phase Salient Pole alternators:- 1 No. Voltage: 220VAC, 60Hz Capacity/RPM /Terminals : 300W/4 Pole m/c / 1800RPM Rotor Construction : Star connected, four terminals including star point brought out on 4 slip rings mounted on shaft. Stator construction : Separately excited field winding with laminated solid yoke, 4 pole brought out on 2 terminals Winding Temp. : A embedded Thermistor brought out on 2 eyelets mounted on terminal box for monitoring winding temperature Frame/ Mounting Shaft dia: 90 Frame, Chasis mounted 19mm dia. With easily swappable gear coupling</p> <p>I. DC INTEGRATED M/C 1 No. Voltage : $V_{arm} = 120V$, $V_{field} = 120V$ Capacity/RP M/Terminals : 300W / 2 Pole m/c / 1800RPM 6 terminals Rotor Construction : Should be Standard commutator / brush arrangement with laminated stack, brought out on 2 terminals Stator Construction : separately excited field winding with laminated pole solid yoke and series winding brought out on 4 terminals</p> <p>j. Phase Shift Lock Rotor Mechanism: 1 No. I) Mounting Method: By mounting PSLR mechanism on C bracket, using 4 nuts & bolts, it can be directly inserted on to the shaft of diameter 19mm of 3Phase AC machine & to screw the C bracket securely to U shaped open slots of chassis. II) Block Rotor Test : Above mechanism is mounted on chassis as shown & coupled to 3 phase AC induction squirrel cage motor (0.5HP) to carry out block rotor test. Here the turning wheel or knob of PSLR mechanism has no role to play.</p> <p>D) Following Essential accessories should be provided with trainer: A) Hand held tacho meter – 1 No. B) Shrouded patch chord – 118 C) Well written students workbook explaining atleast 50 experiments with instructor guide. – 1 No. D) DEMO CD to help student to work by themselves – 1 No.</p> <p>Test gear for Synchronising of 2Nos. Of 3 phase Generator (3 phase AC machines) consist of one set of Synchroscope panel with 3X2 lamps, Sync Switch, essential accessories like connecting cables, students workbook, patch cords etc.</p> <p>NOTE : Following documents are mandatory and are to be submitted along with Technical Bid :</p> <p>1. Front & Back Panel drawing for detailed layout of Input / Output terminals, Power switches, Metering with schematics. 2. Circuit drawings of complete Test Rig.</p>	
1.1.2	<p>Instruction Manual: Should contain Information on features, operation and maintenance. Instructional manual having list of Experiments, brief introduction, circuits, apparatus used, procedure, tabulation etc. Well illustrated documents with clean figure, theoretical explanation to be provided. Log of experiments supported with observatory tables for easy learning.</p>	1 set
	Operation/ Service/ Spare parts manual – 2 sets to be	3 sets (Total)

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.			
Ref. No. Sl. No. 28 of Enclosure 1 (DPR Annexure-2)			
Item : Electrical Machine Trainer			Qty : 1 No.
Sl. No.	Description		
	sent along with Machine and 1 set to HMTI, Bangalore		
1.2	Colour: Standard		
1.3	Set of electrical spare parts for 2 year normal operation. <ul style="list-style-type: none"> • Please indicate the detailed list of spares in Technical bid without price. • Please indicate the detailed list of spares with individual prices in Commercial bid only. 		1 set

3 Phase integrated 300 W motor Trainer

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.	
Ref. No. Sl. No. 29 of Enclosure 1 (DPR Annexure-2)	
Item : 3 Phase integrated 300 W motor Trainer	Qty : 1 No.
Sl. No.	Description
1.	3 Phase integrated 300 W motor Trainer – (Table mounted with castor wheels) with standard and required accessories suitable for Electricals 220V, 3Phase, 60 Hz AC supply / 110V, 1 phase, 60Hz AC.
1.1	Technical Specifications :
1.1.1	<p>Features :</p> <ul style="list-style-type: none"> • Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. • All machines should be mounted on finely painted sturdy base frame with easy machine inter changeability. • Should be able to draw all graphs • Machines should operate upto 300W power levels and upto 1800 RPM. • Must use Trunion mounted DC machine as Dynamometer for loading other machines with facility to measure shaft power using electronic torque / speed measurement • One Dynamometer type DC m/c per aluminum Rack with multiple panels <p>A) Technical Specifications of interfacing panel rack - 1 No Powder coated Sturdy aluminums Flat panel system made up off Alluminium extruded profiles carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Should be able to hold following control panels with colorful overlay.</p> <p>B) Each control panel rack consists of :-</p> <p>Input 3 phase DOL Starter panel [10 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • 4 pole MCB of 220 V/1A . • DOL 9A Contactor with 110V / 60 Hz / 11VA COIL . • Bimetallic thermal O/L relay with range 1.4A - 2.3A . <p>Multifunction 3 Phase Meter 2 Nos.</p> <ul style="list-style-type: none"> • Connection : 3Phase 3/4 wire • Volts Input : 220V/110V AC • Aux Supply : 110V AC, 45-65Hz,5W • Display : LCD Display • CT Input : 5A, 0.1 VA/Ph. • Measurement: V, I, Hz, Pf, KVA, KW, KWh • Computer Input : Modbus RTU RS 485 • Termination : SBSS Terminal <p>FWD/REV ,Star-Delta starter panel [12 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • FWD/REV, 3 pole 3 way switch with centre OFF,6A/220V. • Star/Delta switch 3 pole ,3 way with centre OFF,6A/220V. <p>3 Phase wound Rotor & Sync. Motor panel [8 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • Rotor resistors of 30E/5A with 3 taps of 0E, 15E, 21E, 30E <ul style="list-style-type: none"> • Rotor resistor selector switch ,3 pole.6 Way .6A/220 V. • DC Rotor excitation over current relay (3Amp) <p>1 Phase Motor, Alternator & Sync. Motor Panel [14 Shrouded Banana] - 1 No.</p> <ul style="list-style-type: none"> • 1φ MCBs of 4A/1.6A – 2nos.

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. Sl. No. 29 of Enclosure 1 (DPR Annexure-2)

Item : 3 Phase integrated 300 W motor Trainer

Qty : 1 No.

Sl. No.	Description
	<ul style="list-style-type: none"> • 2no 2P2W selector switches to run as 1ϕ alternator then as synchronous motor. • 8A pushbutton switch to simulate as centrifugal switch. <p>DC voltmeter and DC ammeter panel [14 Shrouded Banana] 1 No a) DC voltmeter(0-150V) b) DC Ammeter (0-5A) with polarity protection diode c) Field failure relay to control Armature supply. Both 6A/6B needed simultaneously.</p> <p>SCR Actuator (variable DC) cum sensor signal conditioning panel [4 Shrouded Banana]-3 Nos.</p> <ul style="list-style-type: none"> • Half bridge SCR based 0V-120V / 5 Amp cosine firing with linear characteristics. • Supports signal conditioning circuit for speed, torque in kg wt to output 0-2.5Vdc (FS). • 3 Nos. of these supplies required for DC Armature, DC motor field and AC generator field. <p>Instrumentation Power supply cum Multichannel DPM panel [10 Shrouded Banana] 1 No (a) +/-12 V ,500 mA (b) +5V ,300mA (c) Unregulated 17V dc/750 mA (d) line synchronizing signal. (e) 13V / 3 Amp. (f) Multi channel DPM for digital display of torque, speed etc</p> <p>Resistor Load Panel 1 No Should have off position to run on no load. (1)AC Resistors = 10K/200WX3 phases/ 6 steps (2) DC Resistors = 750E/400W / 6 steps</p> <p>LC Load panel 1 No (A) Inductive load = 0.15H/0.3H/0.45H/0.6H/0.75H/1.5H/3H/400mAX3Nos. (B) Capacitive load =1.25μ/2.5μ/5μ/415VX 3Nos.</p> <p>C) Machine set should consists of following machines:</p> <p>a. DC INTEGRATED M/C 1 No Voltage : Varm = 120V, Vfield = 120V Capacity/RP M/Terminals : 300W / 2 Pole m/c / 1800RPM 6 terminals Rotor Construction : Should be Standard commutator / brush arrangement with laminated stack, brought out on 2 terminals Stator Construction : separately excited field winding with laminated pole solid yoke and series winding brought out on 4 terminals Chasis mounted, 19mm dia, trunion mounted Machine for use as Dynamometer with torque & speed sensors. Must be able to work as shunt/series/compound motor as well as generator.</p> <p>b. 3 Phase AC Integrated m/c - 1 No. Voltage : 220VAC, 60Hz Capacity/RP M/Terminals : 300W / 4 Pole m/c / 1800RPM 10 terminals Rotor Construction : must be Star connected, four terminals including star point brought out on 4 slip rings mounted on shaft. Stator Construction : Six terminals to be brought out to start the machine using STAR - DELTA Starter. Chasis mounted, 19mm dia, Application: Must work as slip ring wound rotor I.M, synchronous motor, and synchronous generator D)</p> <p>Following Essential accessories should be provided with trainer: A) Hand held tacho meter – 1 No. B) Shrouded patch chord C) Well written students workbook explaining atleast 50 experiments with instructor guide. – 1 No. D) DEMO CD to help student to work by themselves – 1 No.</p>

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.	
Ref. No. Sl. No. 29 of Enclosure 1 (DPR Annexure-2)	
Item : 3 Phase integrated 300 W motor Trainer	Qty : 1 No.
Sl. No.	Description
	<p>Test gear for Synchronising of 2Nos. Of 3 phase Generator (3 phase AC machines) consist of one set of Synchroscope panel with 3X2 lamps, Sync Switch, essential accessories like connecting cables, students workbook, patch cords etc.</p> <p>NOTE : Following documents are mandatory and are to be submitted along with Technical Bid :</p> <ol style="list-style-type: none">1. Front & Back Panel drawing for detailed layout of Input / Output terminals, Power switches, Metering with schematics.2. Circuit drawings of complete Test Rig.

3 Phase salient pole Generator Trainer

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.	
Ref. No. Sl. No. 30 of Enclosure 1 (DPR Annexure-2)	
Item : 3 Phase salient pole Generator Trainer	Qty : 1 No.
Sl. No.	Description
1.	3 Phase salient pole Generator Trainer – (Table mounted with castor wheels) with standard and required accessories suitable for Electricals 220V, 3Phase, 60 Hz AC supply / 110V, 1 phase, 60Hz AC.
1.1	Technical Specifications :
1.1.1	<p>Features :</p> <ul style="list-style-type: none"> • Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. • All machines should be mounted on finely painted sturdy base frame with easy machine interchangeability. • Should be able to draw all graphs • Machines should operate upto 300W power levels and upto 1800 RPM. • Must use Trunnion mounted DC machine as Dynamometer for loading other machines with facility to measure shaft power using electronic torque / speed measurement • One Dynamometer type DC m/c per aluminum Rack with multiple panels <p>A) Technical Specifications of interfacing panel rack - 1 No Powder coated Sturdy aluminums Flat panel system made up off Alluminium extruded profiles carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Should be able to hold following control panels with colorful overlay.</p> <p>B) Each control panel rack consists of :-</p> <p>Input 3 phase DOL Starter panel [10 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • 4 pole MCB of 220 V/1A . • DOL 9A Contactor with 110V / 60 Hz / 11VA COIL . • Bimetallic thermal O/L relay with range 1.4A - 2.3A . <p>Multifunction 3 Phase Meter 2 Nos.</p> <ul style="list-style-type: none"> • Connection : 3Phase 3/4 wire • Volts Input : 220V/110V AC • Aux Supply : 110V AC, 45-65Hz,5W • Display : LCD Display • CT Input : 5A, 0.1 VA/Ph. • Measurement: V, I, Hz, Pf, KVA, KW, KWh • Computer Input : Modbus RTU RS 485 • Termination : SBSS Terminal <p>FWD/REV ,Star-Delta starter panel [12 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • FWD/REV, 3 pole 3 way switch with centre OFF,6A/220V. • Star/Delta switch 3 pole ,3 way with centre OFF,6A/220V. <p>3 Phase wound Rotor & Sync. Motor panel [8 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • Rotor resistors of 30E/5A with 3 taps of 0E, 15E, 21E, 30E <ul style="list-style-type: none"> • Rotor resistor selector switch ,3 pole.6 Way .6A/440 V. • DC Rotor excitation over current relay (3Amp) <p>1 Phase Motor, Alternator & Sync. Motor Panel [14 Shrouded Banana] - 1 No.</p> <ul style="list-style-type: none"> • 1ϕ MCBs of 4A/1.6A – 2nos. • 2no 2P2W selector switches to run as 1ϕ alternator then as synchronous motor. • 8A pushbutton switch to simulate as centrifugal switch.

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. Sl. No. 30 of Enclosure 1 (DPR Annexure-2)

Item : 3 Phase salient pole Generator Trainer

Qty : 1 No.

Sl. No.	Description	
	<p>DC voltmeter and DC ammeter panel [14 Shrouded Banana] 1 No a) DC voltmeter(0-150V) b) DC Ammeter (0-5A) with polarity protection diode c) Field failure relay to control Armature supply. Both 6A/6B needed simultaneously.</p> <p>SCR Actuator (variable DC) cum sensor signal conditioning panel [4 Shrouded Banana]-3 Nos. • Half bridge SCR based 0V-120V / 5 Amp cosine firing with linear characteristics. • Supports signal conditioning circuit for speed, torque in kg wt to output 0-2.5Vdc (FS). • 3 Nos. of these supplies required for DC Armature, DC motor field and AC generator field.</p> <p>Instrumentation Power supply cum Multichannel DPM panel [10 Shrouded Banana] 1 No (a) +/-12 V ,500 mA (b) +5V ,300mA (c) Unregulated 17V dc/750 mA (d) line synchronizing signal. (e) 13V / 3 Amp. (f) Multi channel DPM for digital display of torque, speed etc</p> <p>Resistor Load Panel 1 No Should have off position to run on no load. (1)AC Resistors = 10K/200WX3 phases/ 6 steps (2) DC Resistors = 750E/400W / 6 steps</p> <p>LC Load panel 1 No (A) Inductive load = 0.15H/0.3H/0.45H/0.6H/0.75H/1.5H/3H/400mAX3Nos. (B) Capacitive load =1.25μ/2.5μ/5μ/415VX 3Nos.</p> <p>C) Machine set should consists of following machines: DC INTEGRATED M/C 1 No. Voltage : Varm = 120V, Vfield = 120V Capacity/RP M/Terminals : 300W / 2 Pole m/c / 1800RPM 6 terminals Rotor Construction : Should be Standard commutator / brush arrangement with laminated stack, brought out on 2 terminals Stator Construction : separately excited field winding with laminated pole solid yoke and series winding brought out on 4 terminals Chasis mounted, 19mm dia, trunion mounted Machine for use as Dynamometer with torque & speed sensors. Must be able to work as shunt/series/compound motor as well as generator.</p> <p>3 Phase Salient Pole alternators:- 1 No. Voltage: 220VAC, 60Hz Capacity/RPM /Terminals : 300W/4 Pole m/c / 1800RPM Rotor Construction : Star connected, four terminals including star point brought out on 4 slip rings mounted on shaft. Stator construction : Separately excited field winding with laminated solid yoke, 4 pole brought out on 2 terminals Winding Temp. : A embedded Thermistor brought out on 2 eyelets mounted on terminal box for monitoring winding temperature Frame/ Mounting Shaft dia: 90 Frame, Chasis mounted 19mm dia. With easily swappable gear coupling NOTE : Following documents are mandatory and are to be submitted along with Technical Bid :</p> <p>1. Front & Back Panel drawing for detailed layout of Input / Output terminals, Power switches, Metering with schematics. 2. Circuit drawings of complete Test Rig.</p>	
1.1.2	<p>Instruction Manual: Should contain Information on features, operation and maintenance. Instructional manual having list of Experiments, brief introduction, circuits, apparatus used, procedure, tabulation etc. Well illustrated documents with clean figure, theoretical explanation to be provided. Log of experiments supported with observatory tables for easy learning.</p>	1 set
	Operation/ Service/ Spare parts manual – 2 sets to be	3 sets (Total)

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.			
Ref. No. Sl. No. 30 of Enclosure 1 (DPR Annexure-2)			
Item : 3 Phase salient pole Generator Trainer			Qty : 1 No.
Sl. No.	Description		
	sent along with Machine and 1 set to HMTI, Bangalore		
1.2	Colour: Standard		
1.3	Set of electrical spare parts for 2 year normal operation.		1 set
	<ul style="list-style-type: none"> • Please indicate the detailed list of spares in Technical bid without price. • Please indicate the detailed list of spares with individual prices in Commercial bid only. 		

Squirrel cage induction motor Trainer

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.	
Ref. No. Sl. No. 31 of Enclosure 1 (DPR Annexure-2)	
Item : Squirrel cage induction motor Trainer	Qty : 1 No.
Sl. No.	Description
1.	Squirrel cage induction motor Trainer – (Table mounted with castor wheels) with standard and required accessories suitable for Electricals 220V, 3Phase, 60 Hz AC supply / 110V, 1 phase, 60Hz AC.
1.1	Technical Specifications :
1.1.1	<p>Features :</p> <ul style="list-style-type: none"> • Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. • All machines should be mounted on finely painted sturdy base frame with easy machine interchangeability. • Should be able to draw all graphs • Machines should operate upto 300W power levels and upto 1800 RPM. • Must use Trunnion mounted DC machine as Dynamometer for loading other machines with facility to measure shaft power using electronic torque / speed measurement • One Dynamometer type DC m/c per aluminum Rack with multiple panels <p>A) Technical Specifications of interfacing panel rack - 1 No Powder coated Sturdy aluminums Flat panel system made up off Alluminium extruded profiles carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Should be able to hold following control panels with colorful overlay.</p> <p>B) Each control panel rack consists of :-</p> <p>Input 3 phase DOL Starter panel [10 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • 4 pole MCB of 220 V/1A . • DOL 9A Contactor with 110V / 60 Hz / 11VA COIL . • Bimetallic thermal O/L relay with range 1.4A - 2.3A . <p>Multifunction 3 Phase Meter 2 Nos.</p> <ul style="list-style-type: none"> • Connection : 3Phase 3/4 wire • Volts Input : 220V/110V AC • Aux Supply : 110V AC, 45-65Hz,5W • Display : LCD Display • CT Input : 5A, 0.1 VA/Ph. • Measurement: V, I, Hz, Pf, KVA, KW, KWh • Computer Input : Modbus RTU RS 485 • Termination : SBSS Terminal <p>FWD/REV ,Star-Delta starter panel [12 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • FWD/REV, 3 pole 3 way switch with centre OFF,6A/220V. • Star/Delta switch 3 pole ,3 way with centre OFF,6A/220V. <p>3 Phase wound Rotor & Sync. Motor panel [8 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • Rotor resistors of 30E/5A with 3 taps of 0E, 15E, 21E, 30E <ul style="list-style-type: none"> • Rotor resistor selector switch ,3 pole.6 Way .6A/440 V. • DC Rotor excitation over current relay (3Amp) <p>1 Phase Motor, Alternator & Sync. Motor Panel [14 Shrouded Banana] - 1 No.</p> <ul style="list-style-type: none"> • 1ϕ MCBs of 4A/1.6A – 2nos. • 2no 2P2W selector switches to run as 1ϕ alternator then as synchronous motor. • 8A pushbutton switch to simulate as centrifugal switch.

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. SI. No. 31 of Enclosure 1 (DPR Annexure-2)

Item : Squirrel cage induction motor Trainer

Qty : 1 No.

SI. No.	Description	
	<p>DC voltmeter and DC ammeter panel [14 Shrouded Banana] 1 No a) DC voltmeter(0-150V) b) DC Ammeter (0-5A) with polarity protection diode c) Field failure relay to control Armature supply. Both 6A/6B needed simultaneously.</p> <p>SCR Actuator (variable DC) cum sensor signal conditioning panel [4 Shrouded Banana]-3 Nos. • Half bridge SCR based 0V-120V / 5 Amp cosine firing with linear characteristics. • Supports signal conditioning circuit for speed, torque in kg wt to output 0-2.5Vdc (FS). • 3 Nos. of these supplies required for DC Armature, DC motor field and AC generator field.</p> <p>Instrumentation Power supply cum Multichannel DPM panel [10 Shrouded Banana] 1 No (a) +/-12 V ,500 mA (b) +5V ,300mA (c) Unregulated 17V dc/750 mA (d) line synchronizing signal. (e) 13V / 3 Amp. (f) Multi channel DPM for digital display of torque, speed etc</p> <p>Resistor Load Panel 1 No Should have off position to run on no load. (1)AC Resistors = 10K/200WX3 phases/ 6 steps (2) DC Resistors = 750E/400W / 6 steps</p> <p>LC Load panel 1 No (A) Inductive load = 0.15H/0.3H/0.45H/0.6H/0.75H/1.5H/3H/400mAX3Nos. (B) Capacitive load =1.25μ/2.5μ/5μ/415VX 3Nos.</p> <p>C) Machine set should consists of following machines: DC INTEGRATED M/C 1 No Voltage : Varm = 120V, Vfield = 120V Capacity/RP M/Terminals : 300W / 2 Pole m/c / 1800RPM 6 terminals Rotor Construction : Should be Standard commutator / brush arrangement with laminated stack, brought out on 2 terminals Stator Construction : separately excited field winding with laminated pole solid yoke and series winding brought out on 4 terminals Chasis mounted, 19mm dia, trunion mounted Machine for use as Dynamometer with torque & speed sensors. Must be able to work as shunt/series/compound motor as well as generator.</p> <p>3 phase squirrel cage motor –1 No. Voltage: 220VAC, 60Hz. Capacity/RP M/Terminals : 300W / 4 Pole m/c / 1800RPM 12 terminals Rotor Construction: Diecast rotor. Stator Construction: 6X2 terminals brought out to run machine at two speeds using pole changing method, Chasis mounted with 19mm dia. Applications: Motor should work as Induction generator, Torque speed curve in both motor as well as generator mode.</p> <p>NOTE : Following documents are mandatory and are to be submitted along with Technical Bid :</p> <p>1. Front & Back Panel drawing for detailed layout of Input / Output terminals, Power switches, Metering with schematics. 2. Circuit drawings of complete Test Rig.</p>	
1.1.2	<p>Instruction Manual: Should contain Information on features, operation and maintenance. Instructional manual having list of Experiments, brief introduction, circuits, apparatus used, procedure, tabulation etc. Well illustrated documents with clean figure, theoretical explanation to be provided. Log of experiments supported with observatory tables for easy learning.</p>	1 set
	Operation/ Service/ Spare parts manual – 2 sets to be	3 sets (Total)

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.			
Ref. No. Sl. No. 31 of Enclosure 1 (DPR Annexure-2)			
Item : Squirrel cage induction motor Trainer			Qty : 1 No.
Sl. No.	Description		
	sent along with Machine and 1 set to HMTI, Bangalore		
1.2	Colour: Standard		
1.3	Set of electrical spare parts for 2 year normal operation.		1 set
	<ul style="list-style-type: none"> • Please indicate the detailed list of spares in Technical bid without price. • Please indicate the detailed list of spares with individual prices in Commercial bid only. 		

1 Phase AC integrated 300 W motor Trainer

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.	
Ref. No. Sl. No. 32 of Enclosure 1 (DPR Annexure-2)	
Item : 1 Phase AC integrated 300 W motor Trainer	Qty : 1 No.
Sl. No.	Description
1.	1 Phase AC integrated 300 W motor Trainer – (Table mounted with castor wheels) with standard and required accessories suitable for Electricals 220V, 3Phase, 60 Hz AC supply / 110V, 1 phase, 60Hz AC.
1.1	Technical Specifications :
1.1.1	<p>Features :</p> <ul style="list-style-type: none"> • Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. • All machines should be mounted on finely painted sturdy base frame with easy machine interchangeability. • Should be able to draw all graphs • Machines should operate upto 300W power levels and upto 1800 RPM. • Must use Trunion mounted DC machine as Dynamometer for loading other machines with facility to measure shaft power using electronic torque / speed measurement • One Dynamometer type DC m/c per aluminum Rack with multiple panels <p>A) Technical Specifications of interfacing panel rack - 1 No Powder coated Sturdy aluminums Flat panel system made up off Alluminium extruded profiles carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Should be able to hold following control panels with colorful overlay.</p> <p>B) Each control panel rack consists of :-</p> <p>Input 3 phase DOL Starter panel [10 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • 4 pole MCB of 220 V/1A . • DOL 9A Contactor with 110V / 60 Hz / 11VA COIL . • Bimetallic thermal O/L relay with range 1.4A - 2.3A . <p>Multifunction 3 Phase Meter 2 Nos.</p> <ul style="list-style-type: none"> • Connection : 3Phase 3/4 wire • Volts Input : 220V/110V AC • Aux Supply : 110V AC, 45-65Hz,5W • Display : LCD Display • CT Input : 5A, 0.1 VA/Ph. • Measurement: V, I, Hz, Pf, KVA, KW, kWh • Computer Input : Modbus RTU RS 485 • Termination : SBSS Terminal <p>FWD/REV ,Star-Delta starter panel [12 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • FWD/REV, 3 pole 3 way switch with centre OFF,6A/220V. • Star/Delta switch 3 pole ,3 way with centre OFF,6A/220V. <p>3 Phase wound Rotor & Sync. Motor panel [8 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • Rotor resistors of 30E/5A with 3 taps of 0E, 15E, 21E, 30E • Rotor resistor selector switch ,3 pole.6 Way .6A/440 V. • DC Rotor excitation over current relay (3Amp) <p>1 Phase Motor, Alternator & Sync. Motor Panel [14 Shrouded Banana] - 1 No.</p> <ul style="list-style-type: none"> • 1ϕ MCBs of 4A/1.6A – 2nos. • 2no 2P2W selector switches to run as 1ϕ alternator then as synchronous motor. • 8A pushbutton switch to simulate as centrifugal switch.

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. SI. No. 32 of Enclosure 1 (DPR Annexure-2)

Item : 1 Phase AC integrated 300 W motor Trainer

Qty : 1 No.

Sl. No.	Description
	<p>DC voltmeter and DC ammeter panel [14 Shrouded Banana] 1 No a) DC voltmeter(0-150V) b) DC Ammeter (0-5A) with polarity protection diode c) Field failure relay to control Armature supply. Both 6A/6B needed simultaneously.</p> <p>SCR Actuator (variable DC) cum sensor signal conditioning panel [4 Shrouded Banana]-3 Nos. <ul style="list-style-type: none"> • Half bridge SCR based 0V-120V / 5 Amp cosine firing with linear characteristics. • Supports signal conditioning circuit for speed, torque in kg wt to output 0-2.5Vdc (FS). • 3 Nos. of these supplies required for DC Armature, DC motor field and AC generator field. </p> <p>Instrumentation Power supply cum Multichannel DPM panel [10 Shrouded Banana] 1 No (a) +/-12 V ,500 mA (b) +5V ,300mA (c) Unregulated 17V dc/750 mA (d) line synchronizing signal. (e) 13V / 3 Amp. (f) Multi channel DPM for digital display of torque, speed etc</p> <p>Resistor Load Panel 1 No Should have off position to run on no load. (1)AC Resistors = 10K/200WX3 phases/ 6 steps (2) DC Resistors = 750E/400W / 6 steps</p> <p>LC Load panel 1 No (A) Inductive load = 0.15H/0.3H/0.45H/0.6H/0.75H/1.5H/3H/400mAX3Nos. (B) Capacitive load =1.25μ/2.5μ/5μ/415VX 3Nos.</p> <p>C) Machine set should consists of following machines: DC INTEGRATED M/C 1 Nos Voltage : Varm = 120V, Vfield = 120V Capacity/RP M/Terminals : 300W / 2 Pole m/c / 1800RPM 6 terminals Rotor Construction : Should be Standard commutator / brush arrangement with laminated stack, brought out on 2 terminals Stator Construction : separately excited field winding with laminated pole solid yoke and series winding brought out on 4 terminals Chasis mounted, 19mm dia, trunion mounted Machine for use as Dynamometer with torque & speed sensors. Must be able to work as shunt/series/compound motor as well as generator.</p> <p>1 Phase AC Integrated m/c - 1 No. Voltage : 110VAC, 60Hz Capacity/RP M/Terminals : 300W / 4 Pole m/c/ 1800RPM 10 terminals Rotor Construction : Diecast Rotor Stator Construction : Must have Two windings brought out on 4 terminals for main and auxiliary to configure different motors Split phase , CSCR, CSIR. Chasis mounted with 19mm dia.</p> <p>NOTE : Following documents are mandatory and are to be submitted along with Technical Bid :</p> <p>1. Front & Back Panel drawing for detailed layout of Input / Output terminals, Power switches, Metering with schematics. 2. Circuit drawings of complete Test Rig.</p>
1.1.2	<p>Instruction Manual: Should contain Information on features, operation and maintenance. Instructional manual having list of Experiments, brief introduction, circuits, apparatus used, procedure, tabulation etc. Well illustrated documents with clean figure, theoretical explanation to be provided. Log of experiments supported with observatory tables for easy learning.</p>
	<p>Operation/ Service/ Spare parts manual – 2 sets to be</p>
	<p>3 sets (Total)</p>

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.			
Ref. No. Sl. No. 32 of Enclosure 1 (DPR Annexure-2)			
Item : 1 Phase AC integrated 300 W motor Trainer			Qty : 1 No.
Sl. No.	Description		
	sent along with Machine and 1 set to HMTI, Bangalore		
1.2	Colour: Standard		
1.3	Set of electrical spare parts for 2 year normal operation.		1 set
	<ul style="list-style-type: none"> • Please indicate the detailed list of spares in Technical bid without price. • Please indicate the detailed list of spares with individual prices in Commercial bid only. 		

1 Phase AC integrated Generator & Sync. 300 W motor Trainer

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.	
Ref. No. Sl. No. 33 of Enclosure 1 (DPR Annexure-2)	
Item : 1 Phase AC integrated Generator & Sync. 300 W motor Trainer	Qty : 1 No.
Sl. No.	Description
1.	1 Phase AC integrated Generator & Sync. 300 W motor Trainer – (Table mounted with castor wheels) with standard and required accessories suitable for Electricals 220V, 3Phase, 60 Hz AC supply / 110V, 1 phase, 60Hz AC.
1.1	Technical Specifications :
1.1.1	<p>Features :</p> <ul style="list-style-type: none"> • Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. • All machines should be mounted on finely painted sturdy base frame with easy machine interchangeability. • Should be able to draw all graphs • Machines should operate upto 300W power levels and upto 1800 RPM. • Must use Trunnion mounted DC machine as Dynamometer for loading other machines with facility to measure shaft power using electronic torque / speed measurement • One Dynamometer type DC m/c per aluminum Rack with multiple panels <p>A) Technical Specifications of interfacing panel rack - 1 No Powder coated Sturdy aluminums Flat panel system made up off Alluminium extruded profiles carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Should be able to hold following control panels with colorful overlay.</p> <p>B) Each control panel rack consists of :-</p> <p>Input 3 phase DOL Starter panel [10 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • 4 pole MCB of 220 V/1A . • DOL 9A Contactor with 110V / 60 Hz / 11VA COIL . • Bimetallic thermal O/L relay with range 1.4A - 2.3A . <p>Multifunction 3 Phase Meter 2 Nos.</p> <ul style="list-style-type: none"> • Connection : 3Phase 3/4 wire • Volts Input : 220V/110V AC • Aux Supply : 110V AC, 45-65Hz,5W • Display : LCD Display • CT Input : 5A, 0.1 VA/Ph. • Measurement: V, I, Hz, Pf, KVA, KW, KWh • Computer Input : Modbus RTU RS 485 • Termination : SBSS Terminal <p>FWD/REV ,Star-Delta starter panel [12 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • FWD/REV, 3 pole 3 way switch with centre OFF,6A/220V. • Star/Delta switch 3 pole ,3 way with centre OFF,6A/220V. <p>3 Phase wound Rotor & Sync. Motor panel [8 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • Rotor resistors of 30E/5A with 3 taps of 0E, 15E, 21E, 30E • Rotor resistor selector switch ,3 pole.6 Way .6A/440 V. • DC Rotor excitation over current relay (3Amp) <p>1 Phase Motor, Alternator & Sync. Motor Panel [14 Shrouded Banana] - 1 No.</p> <ul style="list-style-type: none"> • 1ϕ MCBs of 4A/1.6A – 2nos. • 2no 2P2W selector switches to run as 1ϕ alternator then as synchronous motor. • 8A pushbutton switch to simulate as centrifugal switch.

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. Sl. No. 33 of Enclosure 1 (DPR Annexure-2)

Item : 1 Phase AC integrated Generator & Sync. 300 W motor Trainer

Qty : 1 No.

Sl. No.	Description	
	<p>DC voltmeter and DC ammeter panel [14 Shrouded Banana] 1 No a) DC voltmeter(0-150V) b) DC Ammeter (0-5A) with polarity protection diode c) Field failure relay to control Armature supply. Both 6A/6B needed simultaneously.</p> <p>SCR Actuator (variable DC) cum sensor signal conditioning panel [4 Shrouded Banana]-3 Nos. • Half bridge SCR based 0V-120V / 5 Amp cosine firing with linear characteristics. • Supports signal conditioning circuit for speed, torque in kg wt to output 0-2.5Vdc (FS). • 3 Nos. of these supplies required for DC Armature, DC motor field and AC generator field.</p> <p>Instrumentation Power supply cum Multichannel DPM panel [10 Shrouded Banana] 1 No (a) +/-12 V ,500 mA (b) +5V ,300mA (c) Unregulated 17V dc/750 mA (d) line synchronizing signal. (e) 13V / 3 Amp. (f) Multi channel DPM for digital display of torque, speed etc</p> <p>Resistor Load Panel 1 No Should have off position to run on no load. (1)AC Resistors = 10K/200WX3 phases/ 6 steps (2) DC Resistors = 750E/400W / 6 steps</p> <p>LC Load panel 1 No (A) Inductive load = 0.15H/0.3H/0.45H/0.6H/0.75H/1.5H/3H/400mAX3Nos. (B) Capacitive load =1.25μ/2.5μ/5μ/415VX 3Nos.</p> <p>C) Machine set should consists of following machines: DC INTEGRATED M/C - 1 No.. Voltage : Varm = 120V, Vfield = 120V Capacity/RP M/Terminals : 300W / 2 Pole m/c / 1800RPM 6 terminals Rotor Construction : Should be Standard commutator / brush arrangement with laminated stack, brought out on 2 terminals Stator Construction : separately excited field winding with laminated pole solid yoke and series winding brought out on 4 terminals Chasis mounted, 19mm dia, trunion mounted Machine for use as Dynamometer with torque & speed sensors. Must be able to work as shunt/series/compound motor as well as generator.</p> <p>1 Phase Synchronous m/c - 1 No.. Voltage : 110VAC, 60Hz Capacity/RP M/Terminals : 300W / 4 pole m/c / 1800RPM 4 terminals Rotor Construction : should have Single phase wound rotor with terminals brought out on two slip rings mounted on shaft. Stator Construction: One winding will be used to configure synchronous motor and Alternator output when used as single phase generator. Chasis mounted with 19mm dia.</p> <p>NOTE : Following documents are mandatory and are to be submitted along with Technical Bid :</p> <p>1. Front & Back Panel drawing for detailed layout of Input / Output terminals, Power switches, Metering with schematics. 2. Circuit drawings of complete Test Rig.</p>	
1.1.2	<p>Instruction Manual: Should contain Information on features, operation and maintenance. Instructional manual having list of Experiments, brief introduction, circuits, apparatus used, procedure, tabulation etc. Well illustrated documents with clean figure, theoretical explanation to be provided. Log of experiments supported with observatory tables for easy learning.</p>	1 set
	<p>Operation/ Service/ Spare parts manual – 2 sets to be sent along with Machine and 1 set to HMTI, Bangalore</p>	3 sets (Total)
1.2	Colour: Standard	

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.		
Ref. No. Sl. No. 33 of Enclosure 1 (DPR Annexure-2)		
Item : 1 Phase AC integrated Generator & Sync. 300 W motor Trainer		Qty : 1 No.
Sl. No.	Description	
1.3	Set of electrical spare parts for 2 year normal operation. <ul style="list-style-type: none">• Please indicate the detailed list of spares in Technical bid without price.• Please indicate the detailed list of spares with individual prices in Commercial bid only.	1 set

DC Integrated machine Trainer

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.	
Ref. No. Sl. No. 34 of Enclosure 1 (DPR Annexure-2)	
Item : DC Integrated machine Trainer	Qty : 1 No.
Sl. No.	Description
1.	DC Integrated machine Trainer – (Table mounted with castor wheels) with standard and required accessories suitable for Electricals 220V, 3Phase, 60 Hz AC supply / 110V, 1 phase, 60Hz AC.
1.1	Technical Specifications :
1.1.1	<p>Features :</p> <ul style="list-style-type: none"> • Should have 4mm sturdy shrouded banana patch cords and shrouded arrangements. • All machines should be mounted on finely painted sturdy base frame with easy machine interchangeability. • Should be able to draw all graphs • Machines should operate upto 300W power levels and upto 1800 RPM. • Must use Trunnion mounted DC machine as Dynamometer for loading other machines with facility to measure shaft power using electronic torque / speed measurement • One Dynamometer type DC m/c per aluminum Rack with multiple panels <p>A) Technical Specifications of interfacing panel rack - 1 No Powder coated Sturdy aluminums Flat panel system made up off Alluminium extruded profiles carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Should be able to hold following control panels with colorful overlay.</p> <p>B) Each control panel rack consists of :-</p> <p>Input 3 phase DOL Starter panel [10 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • 4 pole MCB of 220 V/1A . • DOL 9A Contactor with 110V / 60 Hz / 11VA COIL . • Bimetallic thermal O/L relay with range 1.4A - 2.3A . <p>Multifunction 3 Phase Meter 2 Nos.</p> <ul style="list-style-type: none"> • Connection : 3Phase 3/4 wire • Volts Input : 220V/110V AC • Aux Supply : 110V AC, 45-65Hz,5W • Display : LCD Display • CT Input : 5A, 0.1 VA/Ph. • Measurement: V, I, Hz, Pf, KVA, KW, KWh • Computer Input : Modbus RTU RS 485 • Termination : SBSS Terminal <p>FWD/REV ,Star-Delta starter panel [12 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • FWD/REV, 3 pole 3 way switch with centre OFF,6A/220V. • Star/Delta switch 3 pole ,3 way with centre OFF,6A/220V. <p>3 Phase wound Rotor & Sync. Motor panel [8 Shrouded Banana] 1 No</p> <ul style="list-style-type: none"> • Rotor resistors of 30E/5A with 3 taps of 0E, 15E, 21E, 30E • Rotor resistor selector switch ,3 pole.6 Way .6A/220 V. • DC Rotor excitation over current relay (3Amp) <p>1 Phase Motor, Alternator & Sync. Motor Panel [14 Shrouded Banana] - 1 No.</p> <ul style="list-style-type: none"> • 1φ MCBs of 4A/1.6A – 2nos. • 2no 2P2W selector switches to run as 1φ alternator then as synchronous motor. • 8A pushbutton switch to simulate as centrifugal switch.

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. Sl. No. 34 of Enclosure 1 (DPR Annexure-2)

Item : DC Integrated machine Trainer

Qty : 1 No.

Sl. No.	Description	
	<p>DC voltmeter and DC ammeter panel [14 Shrouded Banana] 1 No a) DC voltmeter(0-150V) b) DC Ammeter (0-5A) with polarity protection diode c) Field failure relay to control Armature supply. Both 6A/6B needed simultaneously.</p> <p>SCR Actuator (variable DC) cum sensor signal conditioning panel [4 Shrouded Banana]-3 Nos. • Half bridge SCR based 0V-120V / 5 Amp cosine firing with linear characteristics. • Supports signal conditioning circuit for speed, torque in kg wt to output 0-2.5Vdc (FS). • 3 Nos. of these supplies required for DC Armature, DC motor field and AC generator field.</p> <p>Instrumentation Power supply cum Multichannel DPM panel [10 Shrouded Banana] 1 No (a) +/-12 V ,500 mA (b) +5V ,300mA (c) Unregulated 17V dc/750 mA (d) line synchronizing signal. (e) 13V / 3 Amp. (f) Multi channel DPM for digital display of torque, speed etc</p> <p>Resistor Load Panel 1 No Should have off position to run on no load. (1)AC Resistors = 10K/200WX3 phases/ 6 steps (2) DC Resistors = 750E/400W / 6 steps</p> <p>LC Load panel 1 No (A) Inductive load = 0.15H/0.3H/0.45H/0.6H/0.75H/1.5H/3H/400mAX3Nos. (B) Capacitive load =1.25μ/2.5μ/5μ/415VX 3Nos.</p> <p>C) Machine set should consists of following machines: DC INTEGRATED M/C 2 Nos Voltage : Varm = 120V, Vfield = 120V Capacity/RP M/Terminals : 300W / 2 Pole m/c / 1800RPM 6 terminals Rotor Construction : Should be Standard commutator / brush arrangement with laminated stack, brought out on 2 terminals Stator Construction : separately excited field winding with laminated pole solid yoke and series winding brought out on 4 terminals Chasis mounted, 19mm dia, trunion mounted Machine for use as Dynamometer with torque & speed sensors. Must be able to work as shunt/series/compound motor as well as generator.</p> <p>DC INTEGRATED M/C 1 No. Voltage : Varm = 120V, Vfield = 120V Capacity/RP M/Terminals : 300W / 2 Pole m/c / 1800RPM 6 terminals Rotor Construction : Should be Standard commutator / brush arrangement with laminated stack, brought out on 2 terminals Stator Construction : separately excited field winding with laminated pole solid yoke and series winding brought out on 4 terminals</p> <p>NOTE : Following documents are mandatory and are to be submitted along with Technical Bid : 1. Front & Back Panel drawing for detailed layout of Input / Output terminals, Power switches, Metering with schematics. 2. Circuit drawings of complete Test Rig.</p>	
1.1.2	<p>Instruction Manual: Should contain Information on features, operation and maintenance. Instructional manual having list of Experiments, brief introduction, circuits, apparatus used, procedure, tabulation etc. Well illustrated documents with clean figure, theoretical explanation to be provided. Log of experiments supported with observatory tables for easy learning.</p>	1 set
	<p>Operation/ Service/ Spare parts manual – 2 sets to be sent along with Machine and 1 set to HMTI, Bangalore</p>	3 sets (Total)
1.2	Colour: Standard	

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.		
Ref. No. Sl. No. 34 of Enclosure 1 (DPR Annexure-2)		
Item : DC Integrated machine Trainer		Qty : 1 No.
Sl. No.	Description	
1.3	Set of electrical spare parts for 2 year normal operation. <ul style="list-style-type: none">• Please indicate the detailed list of spares in Technical bid without price.• Please indicate the detailed list of spares with individual prices in Commercial bid only.	1 set

Oscilloscope Trainer

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.	
Ref. No. Sl. No. 35 of Enclosure 1 (DPR Annexure-2)	
Item : Oscilloscope Trainer	Qty : 1 No.
Sl. No.	Description
1.	Oscilloscope Trainer – Band with 25Mhz– (Table mounted with castor wheels) with standard and required accessories suitable for Electricals 220V, 3Phase, 60 Hz AC supply / 110V, 1 phase, 60Hz AC.
1.1	Technical Specifications :
1.1.1	<p>Technical Specification:-</p> <ul style="list-style-type: none"> • 500M Sa/s Sampling Rate • 2 Channels • 5.7 in LCD Color Display • USB Host/Device: Support USB Printer and USB Flash Drive • PictBridge Function • Easy scope Software • 12 Languages <p>Sampling Rate : +: 500MSa/s Equivalent Sampling Rate : 10GSa/s C + Series : Single Channel : 32 Kpts; Double Channels: 16Kpts Memory Depth CA Series: Single channel: 40 Kpts; Double Channels : 20Kpts CM Series: Single Channels: 2Mpts; Double Channels; 1Mpts Rise Time: <14ns In put Impedance : 1 M ohm 14pF 25ns/div-50s/div Sec/div Range: Scan: 100ms-50s/div Horizontal Scan Range: 25ns/div-50s/div Analog Bandwidth (at input BNC): 25 MHz</p> <p>Input In PUT Coupling: AC, DC, GND Input Impedance: DC: 1M ohm +/-2% 17pF +/-3pF AC: 1.2M ohm +/-2% 17pF +/-3pF, <=100m V/div 1.0M ohm +/-2% 17pF +/-3pF, >100mV/div Maximum Input Voltage: +400V PK-PK CATI Probe attenuator: 1X, 10X</p> <p>Vertical System Vertical Sensitivity: 2mV-10/div at input BNC (1-2-5 order) Vertical Resolution: 8 bit Channels: 2 Math operation: +, -, *, FFT FFT: Window mode: Hanning, Hamming, Blackman, Rectangular Sampling points 1024</p> <p>Trigger System Trigger Types: Edge, Pulse Width, Video, Slope, Alternative Trigger Modes: Auto, Normal, Single Trigger Sources: Ch1-2, EXT, EXT/5, AC Line Trigger Coupling: AC, DC, LF, rej, HF rej</p> <p>Control Panel Function Auto Set: Auto adjusting the vertical, Horizontal system and Trigger position Save/Recall: Support 2 Group referenced Waveforms, 20 Group setups, 20 Group capture Waveforms</p>

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.

Ref. No. Sl. No. 35 of Enclosure 1 (DPR Annexure-2)

Item : Oscilloscope Trainer

Qty : 1 No.

Sl. No.	Description	
	<p>internal Storage/Recall function and USB flash driver storage function.</p> <p>Measure System Auto Measure: FPRE Shoot, Rise time, Fall time, Freq, Period, +Wid, -Wid, Dut, -Dut, Bwid, Phase, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF Cursor Measure: Manual mode, Track mode and Auto mode.</p> <p>Display Display Mode: Color TFT 5.7in. (145mm) diagonal Liquid Crystal Display Resolution: 320 horizontal by 234 vertical pixels Display color: 64K color Interface: USB Host, USB Device, RS232, Pass/Fail output</p> <p>Environments Temperature: Operating:10⁰C to +40⁰C, Not operating:- 20⁰C to + 60⁰C</p> <p>Power Supply Input Voltage: 100-240 VAC, CAR II, Auto selection Frequency Scope: 45Hz to 440Hz Power: 50VA Max.</p> <p>NOTE : Following documents are mandatory and are to be submitted along with Technical Bid :</p> <p>1. Front & Back Panel drawing for detailed layout of Input / Output terminals, Power switches, Metering with schematics. 2. Circuit drawings of complete Test Rig.</p>	
1.1.2	<p>Instruction Manual: Should contain Information on features, operation and maintenance. Instructional manual having list of Experiments, brief introduction, circuits, apparatus used, procedure, tabulation etc. Well illustrated documents with clean figure, theoretical explanation to be provided. Log of experiments supported with observatory tables for easy learning.</p>	1 set
	<p>Operation/ Service/ Spare parts manual – 2 sets to be sent along with Machine and 1 set to HMTI, Bangalore</p>	3 sets (Total)
1.2	Colour: Standard	
1.3	<p>Set of electrical spare parts for 2 year normal operation.</p> <ul style="list-style-type: none"> • Please indicate the detailed list of spares in Technical bid without price. • Please indicate the detailed list of spares with individual prices in Commercial bid only. 	1 set

PLC Trainer kit

Project: Setting up of Indo – Belize Centre of Engineering, Belize City, Belize.		
Ref. No. Sl. No. 36 of Enclosure 1 (DPR Annexure-2)		
Item : PLC Trainer kit		Qty : 1 No.
Sl. No.	Description	
1.	PLC Trainer kit – (Table mounted with castor wheels) with standard and required accessories suitable for Electricals 220V, 3Phase, 60 Hz AC supply / 110V, 1 phase, 60Hz AC.	
1.1	Technical Specifications :	
1.1.1	<p>Programmable Logic Controller The Trainer should have following features : i) Rack based table top model :Using Aluminum profile rack of 4 x 2 matrix consisting of (5+2) panels Specifications: a) Converter cum distribution panel for digital inputs and digital outputs: All digital I/Os are brought out on this panel for easy connection. b) Converter cum distribution panel for analog inputs and outputs: All digital I/Os are brought out on this panel for easy connection. c) Simulation + extension panel for digital inputs, analog inputs and analog outputs. Provided with 4 no of switches and 4 no of push buttons for digital inputs. 6 no of potentiometer for analog inputs and 2 no of extension for analog output connection. d) Simulation + extension panel for digital outputs with status LED indication.</p> <p>Enclosure: Mounted on replaceable panel in sturdy Aluminium profile rack with IOs brought out on 4MM banana socket on converter cum distribution panel while simulation cum extension panel provides necessary switches lamps, pots etc. Aluminum rack : of 2* 4 matrix used as flat panel demo panel system to house 4 panels needed for the trainer ordered. Complete with all necessary cables.</p> <p>NOTE : Following documents are mandatory and are to be submitted along with Technical Bid : 1. Front & Back Panel drawing for detailed layout of Input / Output terminals, Power switches, Metering with schematics. 2. Circuit drawings of complete Test Rig.</p>	
1.1.2	<p>Instruction Manual: Should contain Information on features, operation and maintenance. Instructional manual having list of Experiments, brief introduction, circuits, apparatus used, procedure, tabulation etc. Well illustrated documents with clean figure, theoretical explanation to be provided. Log of experiments supported with observatory tables for easy learning.</p>	1 set
	Operation/ Service/ Spare parts manual – 2 sets to be sent along with Machine and 1 set to HMTI, Bangalore	3 sets (Total)
1.2	Colour: Standard	
1.3	<p>Set of electrical spare parts for 2 year normal operation.</p> <ul style="list-style-type: none"> • Please indicate the detailed list of spares in Technical bid without price. • Please indicate the detailed list of spares with individual prices in Commercial bid only. 	1 set

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